CALIFORNIA JOURNAL OF SECONDARY EDUCATION

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CALIFORNIA SOCIETY OF SECONDARY EDUCATION

CALIFORNIA JOURNAL
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SYMPOSIUM ON THE JUNIOR HIGH SCHOOL

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California Journal of Secondary Education

Voume 27 FEBRUARY, 1952 Number 2

ONE WAY TO CHANGE SECONDARY EDUCATION

THE Journal this month demonstrates that the subject of *conservation* is being treated quite extensively in the high schools, even though an examination of the daily schedule of a high school might not reveal specific courses entitled *conservation.*

Beginning with the turn of the century and the closing of the physical frontier in the United States, a growing national and regional awareness of the importance of conserving our natural resources has emerged. It was during the administration of President Theodore Roosevelt that national leadership sensed the problem. From many sources, insistent and persistent pressures in favor of conservation, stemming from fundamental needs of the nation, have now, after almost a half century, finally made themselves felt in the schools. This growing recognition of the importance of the problem is reflected in the publication last year of the Twenty-ninth (1951) Yearbook of the American Association of School Administrators entitled *Conservation Education in American Schools.*

While some decry the long time lag between the emergence of a broad social need and its incorporation into the curriculum of the school, there may be considerable wisdom in the manner by which we seem to make haste slowly. Myriads of "special" groups are constantly at work to force their way into the school, as any administrator or teacher can testify. The winnowing of the grain from the chaff is not easy. And once that which is truly valuable is discovered, time is required to fashion it to fit into the school program. The curriculum is full, and daily it becomes more crowded. It is easier to add than to drop subjects and content from the school offering. The knotty problem of what knowledge is of most worth is always with us.

As materials are developed and find their way into the very warp and woof of every subject in the curriculum—as the subject, in this case conservation, which is of such vital importance to the general welfare, becomes a rallying point for serious problem study—then important gains may be credited to secondary education. In some instances, changes of this character which grow slowly, steadily and unobtrusively, without the fanfare of sudden and dramatic alteration in the visible structure of the curriculum, may be of quite profound and lasting significance.

The *Journal* in presenting the symposium this month on Conservation Education pays tribute to the leaders in this field who have worked, and indeed continue to labor, to achieve so much. It is appropriate that its publication coincides with the Third Regional Conference on Conservation of Natural Resources which, under the joint sponsorship of three State Colleges — Sacramento, Chico, and Humboldt, the State Department of Education, and the State Department of Natural Resources, will be held at Chico State College, February 21–23, 1952. —R. N. B.

California's Department of Natural Resources Attacks the Problem of Conservation Education

By EDWARD F. DOLDER

● **The serious efforts during the past decade of California conservation leaders culminated in 1949 in the creation of a position in the Department of Natural Resources entitled "Chief of Conservation Education." Edward F. Dolder, who occupies that position, outlines in broad perspective the scope of the conservation problem facing California and the background and thinking that has gone into the current program. Mr. Dolder combines the talents of newspaperman and technical expert, having served the State Fish and Game Commission and the State Division of Beaches and Parks. He was from 1939 to 1940 editor of the "California Conservationist."**

A CENTURY ago California was rocking in the throes of a great gold rush. Thousands of gold seekers poured into the territory. The abundant natural wealth of the state, its renewable resources, were merely materials used in the search for gold. Its forests supplied timber for the mines and for the shack towns that mushroomed into riotous mining camps; its water provided transportation and hydraulic power to be used in the search for gold; and its fertile topsoil was something to be washed away in order to find the precious metal.

The State was a land of plenty, and even when the gold-seekers turned to farming, stock raising, lumbering, and fishing, the natural resources were merely a means to an end—with no thought that there could be an *end* to the *means*. Activity was geared to a concept of "abundance," of "inexhaustibility." Today too many still hold to this false concept.

With the census count for California's present population probably exceeding 10,500,000 persons, with the State already the second largest in population in the nation, Californians have real cause for concern over the condition of their natural resources. Reliable state authorities estimate that each month 15,000 new residents pour into California. By 1970 it is believed that the State's population will reach 20,000,000 persons. Twenty million mouths to feed, 20,000,000 bodies to clothe, 20,000,000 humans to house, will force tremendous new demands upon the renewable and non-renewable natural resources of the Pacific coast.

In view of these facts the State department of natural resources emphasizes the need for the development of a citizenry that understands the urgent necessity for the wise use of the natural resources of the State for the benefit of ALL the people on a permanent and continuing basis. A major objective of the State's conservation program is the refutation of the false ideology of America's inexhaustibility in terms of natural resources. Let us briefly examine the basic renewable resources of California —the soil, the water, and the vegetation.

CALIFORNIA'S SOIL

The soil problems include erosion, maintenance of fertility, soil leaching because of improper and excessive use of water in irrigation, and more adequate protection of watersheds to reduce flood run-off upon agricultural lands.

The land area of California is slightly in excess of 100,000,000 acres. Ten per cent of this area (10,000,000 acres) has lost more than 75 per cent of its topsoil. Forty-six per cent of the area has suffered from moderate erosion. Slight erosion is occurring on the remaining 44 per cent.

From these figures it would appear that California's soil problems do not

compare with those of the middle west, for example. However, the west coast population is increasing at an alarming rate and the agricultural lands are being called upon to produce food and fiber proportionately. Great market demand tempts farmers to single-crop, to take harmful shortcuts in land management because of the prospects of quick profit. Net results are soil exhaustion and more loss of topsoil.

In 1949 California reconstructed its soil conservation program to facilitate the creation of locally-controlled soil conservation districts and to enable these districts to secure proper technical assistance and the heavy equipment necessary for large-scale soil conservation projects. However, as of today, there are only 72 soil conservation districts in the State, effecting a mere 11 per cent of the agricultural land. The need for public information and education is very apparent.

CALIFORNIA'S WATER—THE LIFEBLOOD OF THE LAND

Of the 100,000,000 acres of land in California, 45,000,000 acres are watershed or water-yielding lands. These lands, covered with timber and brush, receive at least 20 inches of rain a year. The major water resources are in the northern half of the state, in the mountains along the eastern boundary, at the extreme north, and along the northwest coast. Though most of the water resources are within the State, southern California, due to its peculiar geographical position, must rely largely upon water from the Colorado River.

The irregular distribution of water is the result of uneven rainfall, and greater evaporation in southern California. Rainfall is not seasonally uniform. Most of the rain occurs from November to April. Neither is it distributed equally during the rainy season. Much of the rain occurs during heavy storms, and produces floods. This runoff of flood water reduces the net effective rainfall.

There are serious maladjustments in both population and fertile land in California in relation to water supply. Settlement has concentrated very heavily along the southern coast of the State, thereby overdrawing the ground water supply of the area and creating the need for Colorado River water. The fertile land of the San Joaquin Valley, the southern portion of the great Central Valley of California, had sufficient ground water for the first ranchers and cattlemen, but increasing population pressure and rising demands for foodstuffs created an agricultural empire in that area that has drawn ground water down to dangerously low levels from which many smaller farmers cannot afford to pump. Almost 100 per cent of the crops raised in California depend upon irrigation. Of this irrigated land 80 per cent depends upon a water supply transported from sources fifty miles up to several hundred miles distant from the crops.

Water consumption requirements in California are extremely varied. They include irrigation, navigation, salinity control, maintenance of fish life, flood control, hydroelectric production, mining, recreation, domestic, municipal and industrial. Only the first four require substantial amounts of water, with irrigation representing 90 per cent of the demand. Many states rely on coal and oil for industrial power. California must rely to a great extent upon hydroelectric power for its growing industry. While hydroelectric plants do not consume water, they utilize its flow as a source of energy, and must have an adequate and continuing supply of stored water in the right place at the right time to keep the wheels of industry turning.

California's water conservation history has been characterized by trial and error methods. The development has

been single-purpose or piece-meal exhibiting a "cultural lag" owing to the absence of an intelligently informed public opinion, and lack of administrative integration in dealing with the interrelated problems of water, soil and forest conservation.

Despite the absence of an informed public opinion on conservation needs and problems in California, there has been no lack of activity by pressure groups interested in influencing public opinion or in controlling information that has reached the public. Such groups have played an interesting role in influencing legislation and policy development. Neither has there been any lack of activity by and for local interests. For example, public opinion in the California north coast region (where 37 per cent of the water resources of the State are located) has been vocal in favoring local control and administration of individual water conservation projects, and in resisting diversion of the region's surplus water to the Central Valley Project.

Water conservation needs for the entire state call for upstream surveys, watershed protection and management, soil conservation, certain changes in cultural patterns, and multiple-purpose development for most projects. To bring about these activities there must be public understanding which may be developed through the medium of the public school system.

CALIFORNIA'S VEGETATION

The vegetative cover of California ranges from mighty forests and brushy foothill slopes to the seemingly insignificant weeds of the vacant city lot. Due to the long dry periods throughout most of California, followed by heavy, pelting rains the maintenance of a good cover of vegetation is imperative both for soil and water conservation.

Today California is exceeded only by Oregon in national lumber production and yet she must import lumber because consumption is the highest per capita in the United States. California consumes one eighth of the total national lumber production.

In 1940 California produced 2,000,000,000 board feet of lumber as compared with 4,300,000,000 board feet in 1950. Despite well-organized fire-protection systems, and extensive public information campaigns, as the wartime and postwar population of the State boomed, fires in commercial timber and watershed areas greatly increased. Destructive logging operations became widespread in the haste to produce lumber needed in the war effort and the postwar building boom.

After two years of war, conservation leaders and progressive officials of the big lumber interests in the State realized that California's timber supply was being depleted at an alarming rate. In 1943 these men, under the leadership of Governor Earl Warren, prevailed upon the State Legislature to establish a California Forestry Study Committee to survey the forest situation in the State.

In 1945 this committee published a "shocker" report. Californians learned that:

1) The volume of timber being removed from their so-called "inexhaustible" forests was twice the volume being produced by nature.

2) Insects and fire were destroying one-half billion board feet per year—one fourth of the 1940 total production.

3) Approximately one-half of the accessible timber land had been cut-over in the first hundred years of the State's history, with a large part of this cut-over land not now producing new timber because of destructive logging practices and recurrent fires.

4) Lumber practices on private lands in virgin growth were poor; in fact excessively destructive.

Both industry and government recog-

nized the need for correction. As a result the California State Forest Practices Act of 1945 was passed. This act is very important because more than one-half, and at that, the best half, of the commercial timber land of California is in private ownership. The U. S. Forest Service has no control in bringing about wise lumbering practices on these lands. At first the act was without enforcement power, except in cases of extreme violation. It was determined by state government and industry that the act would be enforced by industry, with governmental cooperation, through industry's own system of controls upon "non-conformists". This plan worked well, though slowly, and in 1950 industry and government cooperatively proposed some revisions to the Act, including the installation of broader powers for enforcing its provisions.

These major conservation problems in California consistently pointed up the need for a better public understanding. In 1946 officials of the state and federal natural resource agencies developed new interest in bringing their information to the school children of the State. While educational leaders were interested, no one person, or section, was specifically charged with the responsibilities for conservation education. The State Directors of Education and Natural Resources met to discuss this problem in 1948, and from this meeting came a program of interdepartmental cooperation, which included the creation early last year of the position of Chief of Conservation Education in the Department of Natural Resources to work with a Conservation Education Committee in the Department of Education. Details of this inter-departmental program are contained in the following article, by Herbert D. Gwinn of the State Department of Education.

The noted conservation writer and artist, J. N. (Ding) Darling, in writing of the failure of many science teachers to teach conservation, portrays in dramatic summary the shortcomings of education in conservation:

"Ignorance of the laws of Nature has been, and still is, more responsible for the infractions than willful malpractice. It is therefore necessary before any real progress towards conservation can take place that the educational fraternity shoulder a large part of the responsible burden. It is obviously hopeless to divert our mass population from their ingrown destructive habits when they are not aware of either the natural laws or the dire consequences of their violation.

"How the educational institutions shall accomplish this task is for professional educators to determine. Suffice it here to say that the job must be done and done soon. It is the job of scientists to interpret and correlate the natural laws in such form that the educators may make them clear to the oncoming generations. In a large measure the natural scientists are far ahead of the educators with their work. For instance, scientific research has determined by experiment and proved by demonstration that plants have vital influence on moisture in the soil, one of the most important relationships in human welfare. But botany teachers still occupy the minds of their pupils with identification of species and grade the students accordingly, while geologists, although water is the most precious element within their sphere, ignore it altogether and drill their classes on the relative hardness of horn-blends and talc, and how to distinguish fluorite from feldspar by the number of facets to their crystals. Biologists, whose province is the teaching of the interrelationship of all living things, have wandered off into that rarified atmosphere which surrounds the eternal mystery of when and how life enters protoplasm.

California's Department of Education Attacks the Problem of Conservation Education

By HERBERT D. GWINN

● The Division of Secondary Education of the State Department in California, in conservation education, as in so many other fields, has again been a prime factor in the development of a statewide program. In this instance, the leadership of Herbert D. Gwinn, consultant in Secondary Education, State Department, has been conspicuous. He traces the growth of conservation education in California and points the way to the future.

Mr. Gwinn was, prior to World War II, for twelve years a teacher and administrator in the Big Pine Unified School District. After service in the U. S. Navy, 1942-46, he returned as general coordinator for the Inyo County Schools, joining the State Department staff in 1948. He has been a member of the planning committee of the first regional conference held in Pasadena in 1950 and has had a lifelong interest in conservation.

EARLY BACKGROUND OF CONSERVATION EDUCATION IN CALIFORNIA

For about forty years there has been a section in the Education Code of California which requires the schools to observe March 7, the anniversary of Luther Burbank's birthday, as Conservation, Bird, and Arbor Day.

The observance of this annual spring rite in the public schools brings forth a rash of assembly programs. The standard ingredients for such programs are: a eulogy to Luther Burbank; dainty poems on birds, bees, and flowers; music; a talk by a forest ranger or, failing that, a representative of some single-purpose conservation organization; and a tree planting ceremony for the grand finale after which everyone goes home, free from the worry of Conservation, Bird, and Arbor Day for another year. Such an approach to conservation education does little to stimulate genuine interest in and concern for the serious conservation problems confronting California.

In 1940 the California State Department of Education, perceiving that the conservation education program, particularly at the secondary level, was anemic, decided that a transfusion was in order lest it be left with a corpse on its hands. This transfusion was given through the medium of a State Department bulletin entitled, "California's Natural Wealth, A Conservation Guide for Secondary Schools."

DEVELOPMENT OF THE PRESENT CONSERVATION PROGRAM

In the meantime, many professional organizations were becoming interested in the status of conservation education in California's schools. Among these was the California Committee for the Study of Education. This committee, armed with endorsements from the other professional educational organizations of the state, appointed a Sub-committee on Conservation Education. The functions of this sub-committee were to investigate the teaching of conservation in California's schools, appraise it, determine educational needs in regard to conservation education and make recommendations for improving the teaching of conservation in the schools of the state and for giving better training to both teacher trainees and in-service teachers in the teaching of conservation.

After five years of intensive study, the Sub-committee on Conservation Education prepared an extensive report of its activities together with conclusions

and recommendations. This report was submitted to the California Committee for the Study of Education in March, 1949.

A few months prior to the completion of this report, the State Superintendent of Public Instruction appointed a Conservation Education Committee in the State Department of Education. This committee studied the recommendations for conservation education programs which were subsequently developed in the conservation workshop sessions of the four regional Rural Life and Education Conferences sponsored by the State Department of Education in the spring of 1949. In this way, the Conservation Education Committee of the State Department of Education made itself familiar with current trends in conservation education and was not unprepared for the reception of the sub-committee report previously mentioned.

Since the recommendations of the workshop groups and the subcommittee report for an overall program of conservation education were, in most instances, identical, the State Department of Education Conservation Committee, in June, 1949, adopted a slightly modified and abridged edition of the original conservation report by the sub-committee and distributed it under the title "Proposals for a Program of Conservation Education for the Schools of California."

THE PROPOSALS

The proposals consist of six major parts: (1) Definition; (2) Goals; (3) Philosophy; (4- Educational Plan; (5- Recommendations; and (6) Conclusions. Conservation is defined in the "Proposals" as "the wise use of natural resources for the benefit of all the people on a permanent and continuing basis." The educational plan is two-fold in character. First, a program of education for conservation must be carried on from kindergarten onward. Secondly, the general public must be provided with a program of conservation education through any and all effective means. Both programs must be continuous.

Some of the important specific recommendations were: (1) Conservation education should be integrated with appropriate curriculum experiences and should not be taught as a separate subject except in colleges. (2) More emphasis should be placed upon conservation education in institutions accredited for teacher training. (3) Appropriate instructional materials should be provided.

In conclusion the "Proposals" state: "Progress must depend upon the concerted effort of school administrators, supervisors, curriculum directors, teacher education institutions, and an aroused public opinion on the responsibility of this generation to pass on our natural resources in such condition that the economic welfare of the next generation is assured."

PROGRESS TO DATE

In an effort to bring about coordination of the separate conservation efforts of federal, state, local and private agencies, the position of Chief, Conservation Education, was created in the Department of Natural Resources. The Chief, Conservation Education, is also a member of the State Department of Education Conservation Committee which fact establishes an effective working liaison between the Departments of Resources and Education.

Under the direction of the Chief, Conservation Education, and in cooperation with the State Department of Education Conservation Committee a guidebook for conservation education has been published for the schools of California. The guidebook contains the Education Department's proposals for conservation education, a selected bibliography, lists

of instructional materials, and descriptions of services available to teachers and schools from the various state and federal agencies concerned with conservation education.

In order to assist school districts, counties, and cities to obtain authoritative consultants and speakers for workshops and institutes on conservation education, the Chief, Conservation Education, Department of Natural Resources, has compiled an extensive list of such persons. The list has been distributed to all superintendents and school districts throughout the state.

In the field of instructional material, money has been budgeted for the development and production of a series of three conservation readers for use in grades four to nine, inclusive. Contracts are now being negotiated with authors for these books.

Many courses and workshops are to be offered in different teacher training institutions throughout the state this year. For example, summer courses are being planned at the University of California at Berkeley, Fresno State College, Whittier College, and the University of Southern California. Contra Costa Junior College is planning an adult extension course in conservation to be given this spring, while the San Bernardino City School District is conducting a series of four conservation workshops for the in-service training of teachers this year.

Conservation workshop experiences which are provided through the judicious use of resource personnel and well-planned field trips furnish the participants with many other tangible benefits in addition to a better understanding of our natural resource management and use. One cannot pursue a study of California's natural resources without at once becoming aware of the interrelasionship of regional geography, climate, geology, economics, politics, and social patterns of our state.

A picture of the current status of conservation education in California secondary schools may be obtained by focusing upon the following summary selected from a recent report.[1] The factual evidence in this summary shows that:

1. Ninety-four per cent of the secondary schools offer conservation education of some kind.
2. Five hundred and sixty schools have organized units of work on conservation in existing courses.
3. Twenty-six schools offer conservation instruction, not as a unit of work or separate course, but in relationship to other topics in several different courses.
4. Seventy-five per cent of the schools place conservation education in the subject field of science; specifically in biology and general science courses.
5. Sixty-six per cent of the schools have it in the social studies field; specifically in orientation, senior problems, and United States history courses.
6. Approximately 50 per cent of the schools give between 3 to 25 class hours per year of such instruction.
7. Fifty-five per cent offer such instruction at all grade levels.
8. Twenty-seven per cent have better than average programs.

However, we must keep in mind that the above statistics are related to the status of classroom instruction at the secondary level only. When we consider the production status of instructional materials, and the in-service training opportunities at district, city, and county levels, the picture is not bright.

A recent survey conducted by the State Department of Education Conservation Committee reveals that:

1. Ten counties, 9 cities, and 5 districts

[1] Report of Secondary School Principals, Oct., 1949.

have prepared instructional materials in conservation education.

2. Six counties, 8 cities, and 9 additional districts now have such materials under preparation.

3. Thirteen counties, 9 cities, and 45 districts regularly conducted planned institute programs and workshops for the in-service training of teachers in conservation education.

In order to arouse the interest of the public in the need for conservation education a Regional Conservation Conference, jointly sponsored by the State Department of Education, the State Department of Natural Resources, Pasadena City Schools, and the California Conservation Council, was held at Pasadena City College, February 16–18, 1950. This conference brought together representatives of both public and private agencies concerned with conservation education and interested citizens of the southern part of the state to discuss the conservation problems of that area. Over six hundred persons attended this conference and many favorable reactions to it have encouraged the State Department of Education and the State Department of Natural Resources to consider similar conferences in other regions of the state. A second Regional Conference was held on the Berkeley Campus of the University of California January 25, 26, and 27, 1951. A third such regional conference is to be held at Chico State College February 21, 22, and 23, 1952.

Not long ago, while pausing for refreshments at a little restaurant situated in the middle of the desert, I noticed a sign on the wall which read, "I live in the best country on God's green earth—I mean to keep it that way—so help me God." If this pledge is solemnly kept to God, our country and its natural resources, we will have nothing to fear in the critical years which lie ahead. I say critical because we are already meeting by force of arms one of the greatest challenges to democracy in the history of the world. Our success in the face of this great challenge will not only rest upon human resources, but also upon our natural resources, without which we could not possibly hope to succeed.

INVITATION TO JUNIOR COLLEGE DEANS

On Sunday afternoon, March 30, 1952, the Deans of Women and Deans of Men in the Southern California Junior Colleges are planning a social hour for all deans of women, deans of men, and guidance and personnel officers in junior colleges of the country who will be in Los Angeles to attend the national conventions of the several organizations affiliated with the National Council of Guidance and Personnel Associations. The objective of the Southern California groups is to get all the junior college representatives together early so that plans for trips and visitations may be made and arrangements for use of transportation facilities available be completed. The coffee hour will be held from five-thirty to seven o'clock in a room at the Biltmore Hotel, convention headquarters. All visiting representatives of junior colleges are cordially invited to stop in and meet their professional associates.

Thrift and Conservation Education in the Los Angeles City Schools

By BURTON M. OLIVER

REALIZING the need for a general program concerning conservation at all grade levels and in all subject fields, the Los Angeles City Board of Education on July 1, 1947, established a Thrift, Conservation, and School Savings Section in the Auxiliary Services Division. (A Thrift Program including School Savings had been in operation since 1922.) In addition to promoting a Thrift and School Savings Program on a school-wide basis, this section has the responsibility of cooperating with the Curriculum and Operating Divisions in seeing that conservation education is integrated with the instructional program on all levels. A number of supplementary guides have been developed and distributed to the teachers concerned. However, as rapidly as possible, the outlines of the basic courses of study will be revised to include greater emphasis upon the teaching of conservation.

● **The close relationship between thrift and conservation is reflected in this article and in the official title of its author, Burton M. Oliver, who is supervisor-in-charge, Thrift, Conservation and School Savings Section, Los Angeles City Schools, a position he has held since 1943. In this capacity he has been responsible for the preparation of a Handbook and supplementary guides on Thrift and Conservation. Reared on a forty-acre farm in Utah where conservation and thrift were a daily necessity, he has been from the beginning a strong advocate of such practice. Mr. Oliver was a member of the staff of the Tulare Union High School in 1927-28 and of the Venice High School from 1929 to 1943.**

COOPERATE WITH COMMUNITY AND OTHER ORGANIZATIONS

Inasmuch as the field of conservation is broad, we felt it of prime importance to seek the help of every person and organized group at our disposal. As a result, we have been able to secure considerable material, several illustrated lectures for students and teachers, and special field trips conducted by trained personnel from the following:

California Conservation Council
California State Department of Education
California State Department of Fish and Game
California State Department of Natural Resources
Los Angeles Department of Water and Power
Los Angeles and National Audubon Societies
Los Angeles City and County School Savings Ass'n.
Los Angeles City Fire Department
Los Angeles County Branch of Federated Women's Clubs
Parent Teachers Association
Sierra Club
Southern California Academy of Sciences
State and Federal Forest and Soil Conservation Services
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United States Treasury Department

INSTITUTE PROGRAMS FOR CERTIFICATED PERSONNEL

Bank tours of Head offices of six major banks, and Federal Reserve Bank;

Field trip to Los Angeles Power Plants and Reservoirs; Field trip to San Gabriel River Wildlife Sanctuary; Field trip to San Dimas Experimental Station; illustrated lectures entitled "Conservation of California Wildlife", "California —Playground Extraordinary", "California, From Desert Sand to Arctic Snow", and "Our Natural Parks", National Audubon Screen Tours—each of the five illustrated lectures are given at three locations.

SPECIAL EMPHASIS

Each school has a Faculty Thrift Chairman, assisted by a student committee, to coordinate the entire program as directed by bulletins throughout the year. Special activities are suggested and appropriate materials are provided each school during National Fire Prevention Week during October; National Thrift Week during January; California Conservation Week during March; and the Forest Fire Prevention Program during May. A fairly adequate number of films and other visual aids are available for use at all times. Special Thrift posters for classroom use are made available four times a year.

The following will briefly illustrate the emphasis placed on Thrift and Conservation education in the schools.

ELEMENTARY SCHOOLS

Assemblies related to saving money, and the wise use of resources given by supervisors for grades 4–6.

Field trips for grades 4–6 to the San Gabriel River Wildlife Sanctuary.

Illustrated talks are provided for a number of schools on the conservation of soil, water, forests, and wildlife.

A small number of teachers have conducted a unit of work on conservation.

Special tour of community banks for grades 5–6 with evaluation lesson by a supervisor. (As a result of these tours there are now 30,000 pupils with savings accounts.)

SECONDARY SCHOOLS

Considerable emphasis is placed on the conservation of natural resources in the following subjects:

Agriculture—The importance of using wisely all natural resources as related to our economic welfare is stressed in all classes. Specific emphasis is placed on the value of conserving and rebuilding the fertility of the soil through composting leaves, grass clippings, and other materials usually taken from the average lot.

A favorite activity for agriculture students is a week-end trip to our Forestry Center in the Angeles Forest where they learn about some of the factors which govern the conservation of water in a typical watershed area. Such factors include fire prevention, safety in camping, use of native shrubs on the watershed, trees and their relationship to soil erosion and water conservation.

The entire four hundred acres at the Pierce Junior College of Agriculture have been classified, through cooperation with the Soil Conservation Service, according to the type of soil and crop best suited to that soil. Care has been taken to make the best utilization of the land according to all factors involved. This probably is one of the outstanding examples of conservation work in this part of the country as an educational conservation program.

Science—All pupils are required to take one semester of science in the eighth, ninth, and tenth grades. One of the major objectives listed in the Outline Course of Study is conservation of natural resources. In these required courses a unit on conservation of natural resources is given in the ninth grade, and a unit on conservation of human resources in the tenth grade.

The ninth grade unit develops such problems as: Why is conservation so important to us? What are we doing to conserve our human resources? What are we doing to conserve our soil? What are we doing to conserve our water supply? What are we doing to conserve our forests? How can we help prevent forest fires? What are we doing to conserve our mineral resources?

The tenth grade unit includes the following topics: Conservation of health, cause and prevention of disease, drugs and patent medicines, community health —Federal, State, and local Health Agencies, the problem of supplying wholesome food and water to the public, and the problem of sewage, garbage, and rubbish disposal. Pupils may elect a second semester in the tenth grade which has a very good unit on the conservation of natural resources.

Social Studies—A fair amount of time is devoted to the study of *conservation* as an integrated part of the eighth and eleventh grade social studies subjects. In the B8, during the study of the pioneer period of U. S. History, the value of the wise use of our natural resource is a fundamental part of the units of work. In the A8, during the study of the unit on men and machines, *conservation* is one of the dominant themes. In the A11, the unit on the Industrialization, Consolidation and Expansion of the United States, the study of *conservation* is of primary importance. Two supplementary texts have been used on an experimental basis in a number of schools. These books, *Conservation and Citizenship* by Renner and Hartley, and *Conservation of Natural Resources*, a Charles Merrill publication, have been very helpful and have been recommended for general classroom use.

CITY AND STATE COLLEGE

A course of three semester units on the Conservation of Natural Resources has been offered for the past two years. Education students, teachers in service, and other students have been taking advantage of this course.

IN-SERVICE TEACHER TRAINING PROGRAM

In-service classes in the conservation of natural resources are provided after school hours and during the summer for teachers of all levels of instruction regardless of subject field. Separate classes are planned for elementary teachers and are conducted by the two supervisors assisting the writer, and a few teachers trained for this work. Part I consists of eight two-hour meetings and thirty-two hours of preparation. It includes the conservation of soil, water, forests, wildlife, National Parks and Monuments, and other aspects of conservation. Part II, of the same duration, considers the application of Part I by grades to the basic instructional program. Practically all of the reading material is furnished each teacher in the form of pamphlets supplied by the various agencies cooperating with us. Usually, one good film is shown each week during the Part I class. Ninety per cent of the class members usually take the two field trips permitted as part of their preparation time.

On the secondary level, all teachers, including those from junior colleges, are eligible to participate in the same class. These classes are conducted by a number of science teachers, and the writer. A kit of materials is also provided for each teacher, a film is shown each class session, and two field trips are planned. One unit of credit is granted for the successful completion of each eight two-hour classes.

The following is a copy of the content material of the two classes for secondary teachers:

PART I

FIRST MEETING: INTRODUCTION

A. Scope of course, objectives, and requirements.
B. Distribution of materials.

SECOND MEETING: HISTORY OF THE CONSERVATION MOVEMENT

THIRD MEETING: SOIL CONSERVATION

A. Nature of soil.
B. Soil destruction.
C. Remedial measures.
D. Population pressures.

FOURTH MEETING: WATER CONSERVATION

A. Importance of water resources.
B. Domestic and industrial uses.
C. Water problems of Southern California:
   1. Irrigation and drainage.
   2. Flood control.
   3. Pollution.
   4. Transportation.
   5. Power.
   6. Recreation.

FIFTH MEETING: FOREST CONSERVATION

A. Extent and distribution of our forests.
B. Economic use:
   1. Watershed.
   2. Timber and other products.
C. Forest destruction:
   1. Logging methods.
   2. Fires.
   3. Pests and diseases.
D. Remedial measures:
   1. Fire protection.
   2. Insect and disease control.
   3. Sustained yield.

SIXTH MEETING: WILDLIFE CONSERVATION

A. Value of wildlife:
   1. Economic.
   2. Recreational.
   3. Aesthetic.
B. Importance of the balance of nature in the animal world.
C. Management of wildlife:
   1. Education.
   2. Legislation.
   3. Law enforcement.

SEVENTH MEETING: OTHER ASPECTS OF CONSERVATION

A. Respect for private and public property.
B. Proper use of school supplies.
C. Wise use of money:
   1. Spending.
   2. Giving.
   3. Savings.

EIGHTH MEETING: SUMMATION AND EVALUATION

A. Evaluation of course.
B. Complete In-Service Training Records, and Assignment Sheet.
C. Return all instructional materials.

BIBLIOGRAPHY

Broomfield, *Pleasant Valley;* Osborne, *Our Plundered Planet;* Vogt, *Road To Survival.*

Note: Forty-four other books are also listed.

AUDIO-VISUAL AIDS

All films and other aids are listed under the following headings: General, Soil, Water, Forests, Wildlife, Time, Materials, and Money.

ASSIGNMENT SHEET

A separate sheet which is given to each teacher, suggesting the amount of preparation time to be spent on each topic, with space to record the title and hours spent, must be signed and returned to the instructor at the conclusion of the class.

PART II

FIRST MEETING: INTRODUCTION

A. Scope of course, objectives, and requirements.
B. Distribution of materials.

SECOND MEETING: CONSERVATION OF GRASSLANDS

A. Grasslands of the United States — extent and character.
B. Historical destruction of the rangelands — overgrazing and the expansion of agricultural areas.
C. Remedial measures.

THIRD MEETING: RECREATIONAL RESOURCES

A. Importance of recreational areas.
B. National parks and monuments.
C. State and local parks.

FOURTH MEETING: SAME GENERAL SUBJECT AS THIRD MEETING

FIFTH MEETING: MINERAL RESOURCES

A. Mineral fuels — coal, gas, and petroleum.
B. Metallic minerals.
C. Non-metallic minerals.
D. Mineral wealth and national strength.

SIXTH MEETING: SAME GENERAL SUBJECT AS FIFTH MEETING

SEVENTH MEETING: PLANNING IN THE FIELD OF CONSERVATION

A. Central Valley Project of California.
B. Colorado River Project.
C. Tennessee Valley Authority, etc.

EIGHTH MEETING: SUMMATION AND EVALUATION

A. Evaluation of course.
B. Complete In-Service Training Records, and Assignment Sheet.
C. Return all instructional materials.

BIBLIOGRAPHY

The references are classified and listed to correspond with the content.

AUDIO-VISUAL AIDS

All films and other aids are listed under the following headings: Grasslands, Recreational Resources, Mineral Resources, and Planning in the field of Conservation.

ASSIGNMENT SHEET

A separate sheet pertaining to Part II, which is provided each teacher, serves the same purpose as indicated for the Part I class.

After conducting our In-service Teacher Training classes for the past two years for elementary teachers and the past year for secondary teachers, over three hundred elementary and one hundred secondary teachers have completed the projects for credit.

As a result of these classes and the other phases of the Thrift, Conservation, and School Savings Program, we consider that real progress is being made toward securing greater emphasis upon this important area of learning.

CALIFORNIA HIGH SCHOOL STUDENTS TEST HIGH ON NATIONAL NORMS

One measure of student achievement is to be found in data accumulated by the American Council on Education. The Council administered tests in 1945 to 35,432 members of the Armed Forces who were graduates of public high schools in the 48 states.

These tabulations show that a student must have had a standard score of at least 57 on these tests in order to place in the upper 25 per cent of all the students tested in the nation. In the Southern Region he needed only a standard score of 54; in the North Central Region a standard score of 56; in the North Western Region a standard score of 57; in the Middle Atlantic Region a standard score of 58; and in the New England Division a standard score of 58 in order to place in the upper 25 per cent of those tested in each respective region; but in California a student needed to make a score of 59 in order to place in the upper 25 per cent of all the students tested in California. Any student falling in the top 25 per cent of the group tested in California would place in the top 20 per cent of those tested in the nation as a whole.

This comparison furnishes some indication of the superior performance of California high school students when compared with students in other sections of the country. — Quoted from Roy Simpson, State Superintendent, Public Instruction, in *CTA Journal*, January 1952.

In-Service Training of Teachers for Conservation Education

By ELSIE FRANCES GIBBS

● The central place of the teacher in any educational movement is perennially stressed. Recognizing this in connection with conservation education, Elsie Frances Gibbs reports the efforts of one city, San Bernardino, California, to help its teachers improve their preparation in this field. The article illustrates in detail the many rich resources which may be drawn upon in a community.

Dr. Gibbs is Director of Secondary Education, San Bernardino City Schools. Before coming to California she was a teacher and counselor in schools in the Middle-Western Region of the United States. She received her doctorate in School Administration from the University of California at Los Angeles in 1947.

ADMINISTRATORS in San Bernardino recognize that while many colleges and universities provide the type of pre-service education which alerts teachers to the needs and problems of conservation in general, the development of a functional, well directed conservation program aimed at community problems is the responsibility of those in charge of in-service training.

Many teachers are new to the community in which they are teaching; some are new to California. Alert teachers, old and new, seek to supplement their background of general information by first-hand acquaintance with the immediate community in which they teach. To obtain such first hand information individually is an insurmountable task even for an experienced teacher.

Educational leadership can itself do much to implement an effective program, but conservation education is so far-reaching and so technical that it should include leaders from specialized local lay groups who are concerned with the wise use of natural resources and are aware of the problems of the dwindling sources of supply. These include Departments of Water, Agriculture and Forestry and others.

Although conservation has had a recognized place in the San Bernardino curriculum for many years, changing patterns of life in the community itself call for more stress on conservation education. The immigration of so many people in the last decade has more than doubled the population of this region. This, plus the rapid extension of industry, has developed an awareness of the need of sensitizing the adult as well as the youthful population to the local problems and of training them in how and when to conserve the rich natural resources of this area. Recently, such alarming local newspaper headlines as "Provide Water or Deport People" carried a definite warning from authorities such as ex-Senator Ralph Swing. Other civic and political leaders have used the mediums of the radio, newspapers, and public resources of the valley.

Recognizing the importance of the problem, representative teachers, both elementary and secondary, voluntarily attended summer workshops in conservation sponsored by various colleges and the State Department of Education. Not all teachers are able to take advantage of these workshops. Those who did were among the foremost in requesting a further in-service program that would stress local conservation needs and problems.

To provide a definite well-organized in-service training for teachers, a committee was formed in the spring of 1951 to plan a series of meetings, discussion groups and trips. Foremost on this com-

mittee were Mr. Frank B. Lindsay, Assistant Superintendent in Charge of Secondary Education for the State of California, Mr. Edward Dolder, Chief, Conservation Education, Department of Natural Resources, Mr. Herbert D. Gwinn, Consultant in Secondary Education for the State Department of Education, and Mr. F. Eugene Mueller, Superintendent of San Bernardino City Schools. In addition to these leaders, the committee included representatives of the City, County or Federal Departments of Forestry, Agriculture and Water, as well as a representative group of school people, including elementary as well as secondary teachers and administrators. An entire day was spent in discussing the scope and sequence of the problem. Community representatives expressed themselves as being highly honored to be invited to participate and offered their services during the forthcoming months. As a result of this first meeting, a series of meetings and activities was planned for the school year.

Leaders from the state department and specialists from lay groups emphasized the necessity of bringing to boys and girls through the teachers a recognition of the inter-relatedness of natural resources and the extent to which social progress is dependent upon their wise utilization.

The series of meetings planned for the fall and winter of 1951–52 emphasized the resources of the local region and its immediate problems with their social and financial implications. Under the guidance of forestry, agricultural or other specialists, these are to be followed in the winter and spring of 1952 by trips for teachers.

Each meeting includes an outstanding speaker who is an authority in his field and can bring a rich background of scientific, timely information of special local interest. His talk is followed by a discussion led by a panel of equally recognized authorities in related fields. Teachers are encouraged to ask questions or make comments. Teacher attendance is voluntary and includes, in addition to science and social living teachers, many from other departments who are interested in being informed concerning community problems. Kenneth Dyal, Postmaster, recognized as a highly skilled moderator, accepted the responsibility of moderating the meetings, thus giving continuity to the series. Because of his interest and desire to give recognition to the programs, Superintendent Mueller is the chairman for the series.

Through a questionnaire, teachers indicated that after-school meetings were more convenient for a majority of the group. Each meeting begins promptly at 3:45 P.M. with the best motion picture, series of slides, or film strips available to the department sponsoring the meeting. This permits teachers to see and evaluate the newest and best materials available. The speaker begins immediately upon completion of these audio-visual aids, which end not later than 4:00 P.M. Following the speaker's thirty minute presentation, a free discussion by the panel members is interspersed by questions from the audience.

To give unity to the discussion the speaker writes a brief outline of his presentation which is mailed to the Director of Secondary Education prior to the meeting. Each panel member is invited to mail from one to three pertinent questions or points of information. These are duplicated and distributed a few days prior to the meeting to the speaker, moderator, chairman and panel members. Immediately prior to the meeting, these participants meet for approximately fifteen minutes to plan the final details of the meeting.

At the close of each meeting teachers are given opportunity to hand in cards, giving their evaluation of the meeting

and suggestions for improvement of the next session. Speaker, panel members, moderator, and chairman adjourn from the meeting to an evaluation meeting with the planning committee, making a total of about twenty participating. This is a simple dinner meeting followed by a short evaluation and planning period, usually adjourning by 7:00 P.M. This session has proven very helpful. Frankness and sincerity, plus a real desire for future meetings to be successful, lend a constructive tone to the discussion.

The series of five meetings planned to show the inter-relationship of the problems of soil, water, forest, and wild-life in this region opened with the topic "The Natural Resource Problems of the San Bernardino Region and the need for Conservation Education." The speaker was Clinton Schonberger, professor of biological science at the San Bernardino Valley College. He has had five years experience as a lecturer and naturalist in California State Parks. Edward Dolder, Chief, Conservation Education, Department of Natural Resources, was consultant with the following departments represented as indicated:

Ralph LaRue, County Director and Farm Advisor, San Bernardino

Arthur L. Darsey, United States Soil Conservation Service, Riverside

Bard Livingstone, City Water Department, San Bernardino

Norman J. Harris, California Division of Forestry, Riverside

John Laughlin, District Game Manager, Riverside

"Water for the City", a new film loaned by Mr. Dolder, preceded the lecture.

The second meeting featured water conservation with Otto C. Knudson, Chairman of the Board of Directors of the Redlands Highland Soil Conservation District, speaker, with the following departments represented on the panel:

Phillip B. Hasbrouck, Advisor to the Board of Directors and Consulting Engineer to the Fontana Union Water Company

Lloyd Martin, Hydrologist, San Bernardino County Flood Control District

Horace P. Hinckley, General Manager, Bear Valley Water Company, Redlands

Norman J. Farrell, Supervisor, United States Department of Agriculture

Clinton Schonberger, Professor of Biological Science, San Bernardino Valley Colloege

Other meetings scheduled include soil conservation, forestry conservation, and recreational use of wild lands.

Trips for teachers are being planned with them cooperatively by leaders from forestry, recreation, water and soil conservation, to see examples of features cited by the speakers. For example, a trip to see chaparral and scrub cover will also include area denuded of such covering by fire. Experts will point out the definite results to soil, water control, wildlife and recreational facilities. The Forestry Service has volunteered cars for transportation and a guide for each car.

Working currently with the meetings on conservation are curriculum committees which endeavor to adapt materials and activities for the curriculum in relation to maturity levels and subject areas. It is recognized that effective teaching of conservation should be both sequential and special in nature but not a separate subject, nor even a separate unit. It should rather be integrated within the various units but with a recognized place in the written curriculum. Frequent emphasis on conservation may thus be secured by teaching against the background of local settings and regional problems. Other committees are working with the coordinated curriculum committees in preparing bib-

liographies of printed and audio-visual materials and in planning trips on which teachers may take their students. A list of places which teachers may encourage their students to visit and observe examples of phases of natural resources or problems is also being prepared. Students are assisting in recommending radio programs, giving background for these discussions.

The help of organized groups in the community is stimulating and far reaching. The whole-hearted enthusiasm of representatives of the Audubon Society, Isaac Walton Club, the Sierra Club, Woman's Club, and several service clubs has added much to the zest of the discussion.

Prior to the first meeting, personal letters were sent to program chairmen of all leading service clubs, inviting them to attend or send a representative in order that they might evaluate for themselves the timeliness and interest of the topics presented. Some invitations have already been extended to speakers to address service clubs on some phase of conservation. The planning committee considers that adult discussion and participation will aid students in developing awareness of the problems.

Newspapers have given first page space to announcing the meetings and to a coverage of the meetings. Boxed stories, etc. have drawn the attention of the public to the efforts of the schools to arouse public opinion especially among the young generation to improve the habits of the people, so that we may pass on our natural resources to future generations with a minimum of waste.

The art department is actively cooperating in both elementary and secondary levels, taking problems at different grade levels to avoid repetition. Various media are used to give added student interest. This work is calling for close cooperation among the various departments in planning, research, and evaluation. The Art Consultant for the city schools is a member of the central coordinating and planning committee.

The cooperation of the many departments within the schools and of the schools with governmental and other agencies indicate that greater attention will be paid to conservation and that greater interest will be manifested by citizens at large. The program is broad, with many implications for the curriculum. Interest is already developed. The immediate problem is to take conservation education outside the classroom into the real laboratory of nature with teachers trained on-the-job, able to teach with confidence and discrimination.

TYPES OF CURRICULA IN CALIFORNIA HIGH SCHOOLS

In the 1950–1951 school year the 411 four-year and senior high schools in California offered 1,966 curricula of which 401 were general in nature, 381 college preparatory, 302 business, 277 homemaking, 220 industrial arts, 211 various vocational arts, and 174 vocational agriculture. Sixty-seven high schools offered a curriculum in fine arts, including music. — Roy E. Simpson, Superintendent of Public Instruction, writing in *CTA Journal*, January 1952.

Conservation Education in the Pacific Northwest Region

By ELMER D. FULLENWIDER

● The lush natural resources and the spectacular population and industrial growth of the Pacific Northwest Region combine to throw dramatic highlights on the problems of conservation. The harnessing of the mighty Columbia River is one of the most exciting chapters in the development of the New West. Consequently, we welcome this description by Elmer Fullenwider of the program of conservation education in the Pacific Northwest Region.

Mr. Fullenwider is a teacher of social studies in the James Monroe Junior High School, Seattle, Washington. He is co-author with W. A. King, principal of his school, of a volume entitled "The Pacific Northwest: Its Resources and Industries," published by the Southwest Publishing Company in 1938. He instructs the in-service course for teachers in the Seattle Public Schools and has been a visiting instructor at the University of Washington and the Southern Oregon College of Education.

POINT OF VIEW

"Every school, rural or urban, is part of a larger regional setting as well as of its local community. Unless this fact is clearly understood by school administrators, (and teachers) many programs of conservation education are likely to be concerned too largely with the immediate environment. Pupils need to learn that their own welfare often depends on the use which is made of basic resources outside the community in which they live, and even outside the state. They should be aware, also, that resource use in their own community has far-reaching effects."[1]

Conservation education programs in the Pacific Northwest Region reflect this view. The resource study or survey of the local community is considered incomplete until it has been fitted into its regional setting. In this way the pupils learn that their welfare is one of regional interdependence. It is one of dependence upon other people and dependence upon natural resources outside their community and often far beyond the political boundary lines of the home state.

The following analyses of everyday activities provide examples of regional resource relationships:

I turn on an electric light. I have drawn on the services of people and a basic natural resource that encompasses related parts of the entire Columbia River System. A recent threatened "brown out" in the Pacific Northwest has been averted by rain in the headwaters of the Columbia covering parts of Canada, Montana, Idaho and Washington. Thus conditions a thousand miles away across state and international political boundaries influence our everyday living far more than we have realized.

I open a can of salmon. I may know that the commercial fisheries of the State of Washington are worth over $200,000,000 annually and that our commercial fisheries are probably the best example of applied natural resource conservation. I may know the part that the College School of Fisheries, University of Washington has recently contributed to our knowledge of control and conservation of salmon. My

[1] American Association of School Administrators. Twenty-ninth Yearbook. Conservation Education in American Schools. 1201 Sixteenth Street, N.W., Washington, D.C., 1951. pp. 181-182.

perspective however is not complete if I do not see this industry in its regional setting. What is the relation of the Fraser River, a river that is completely within Canada, to the commercial fisheries of Washington State? What is the influence of the Salmon River of Idaho? What is the effect of the issue between the fisheries conservation program and the hydroelectric power development within the Pacific Northwest? What are the problems of the International Salmon and Halibut Fisheries Commissions?

I read a book. An analysis of the paper pages might carry us to the forested slopes of the Cascade Range. It might include discussion of forest ecology, meteorological conditions and other basic physical relationships. One might discuss the chemistry of pulp manufacture and other processes to the finished article, the page, before us. Possibly there are also political implications such as reciprocity, value of the pound?

Running through such regional resource analyses is the constant thread of human relationships, cooperation, an awareness of the important part that each plays in the sequence from basic natural resource to delivered finished product — wise use without waste of either natural or human resources.

These examples of interrelationships of resources, the cooperation of local, state and international groups of men in the wise use of basic resources could be multiplied many times. They form a vital part of the concept of regional resource relationship that lies behind our conservation education practices.

It is evident that the term region or regional as thus far used is flexible in its meaning. The Columbia River System gives a certain regional oneness to most of Washington, Oregon, Idaho, and Montana, west of the continental divide. The term region as used here applies to an area in which resource use problems extend beyond or cut through political boundaries thereby affecting other states, or to problems that require interstate and possibly international cooperation for effective solution. The approach to a regional resource problem may be biological, or economic. Seldom, however, is there such a neat division of the problem. A resource problem is so interrelated that it usually contains political considerations in addition to the above facts.

BACKGROUND OF REGIONAL RESOURCE APPROACH

The first over-all systematic study of problems concerning regional resources in the Pacific Northwest was begun by the Pacific Northwest Regional Planning Commission in 1934. Its 1942 report, "Development of Resources and of Economic Opportunity in the Pacific Northwest," to the National Resources Planning Board, states: "Among all the regions of the United States, none is more closely knit together by physiographic, economic and cultural ties than the Pacific Northwest. Since the early days of the fur trade, the economic life of the region has been based on the export of raw materials—minerals, lumber, and agricultural products, in particular."

Will not minerals, forests and grasslands, soil, wildlife and water resources always be the basic source of the wealth, the jobs, industries and occupations of our population? Are they not the hub around which revolves our social and political as well as our economic activities? Are they not then logical centers of conservation education?[2] The important role in the extension and even possible substitution of our known basic resources by technological development, chemistry and other man-made developments should not slow down our ef-

[2] *The Northwest Conservationist*, May-Dec., 1951. Published by Earl Coe, Secretary of Washington State in cooperation with the Northwest Conservation League.

forts to use our resources wisely, to extend their use indefinitely for all people for all time to come.

It was with this thought in mind that in 1935 Seattle Public Schools began an experimental class, in the James Monroe Junior High School to study the Pacific Northwest: Its Resources and Industries. It was the beginning of a regional study to enable the student to gain a better understanding of the influence of natural regions in determining where people tend to live and what they do to earn a living. It was intended to aid the student in visualizing the whole area in terms of land, water, other natural resources, transportation and chief industries. Among the listed instructional guides was, "Every opportunity should be used to impress upon the student the meaning and the importance of the conservation of natural resources." A textbook was prepared for the course.[3] The authors drew upon literature from many sources in the four states of the Pacific Northwest. The sources include colleges and universities, Federal, regional, state, county, and local agencies. Private industries opened their factories and files for observation and study. This regional point of view including the use of economic maps of the Pacific Northwest was encouraged by the Pacific Northwest Regional Planning Commission.

In 1938 two Seattle teachers attended a Pacific Northwest Regional Planning Commission meeting at Boise, Idaho.[4] Here they wrote a resolution requesting that this commission make its research publications available to an educational group who would rewrite them for the use of junior-senior high school students. Mr. J. W. Condie, who was State Superintendent of Public Instruction at that time, presented the resolution to the Pacific Northwest Regional Commission.[5] The resolution was accepted and a Northwest Regional Council was subsequently formed. This Council in 1939 prepared a bibliography of research materials pertaining to the natural and human resources of the Pacific Northwest Region. R. F. Bessey, Consultant to the Pacific Northwest Regional Planning Commission stated in part 1 of this publication: "A vast amount of modern scientific investigation is socially and economically sterile because no one has undertaken to fit it into a broader and more comprehensive analysis that has real significance. We expend great amounts of time and energy collecting facts that never get woven into any meaningful picture." . . .

"Some of our research might lead toward determination of what climate and other environmental factors may mean to population, energy, health, culture, or industry, of the present and future; what dominant racial and historical factors may have to do with regional culture and progress; what available resources may mean in regional security and advancement."

"Little more than a beginning has been made with respect to the study of Pacific Northwest regionalism."[6]

In this field of cooperative research the Northwest Regional Council might aid very greatly in generating, stimulating, and guiding work, as well as in providing needed "clearing house" services.[7]

The Northwest Regional Council's objectives are:[8]

1. To stimulate a greater public awareness

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[3] King and Fullenwider, *The Pacific Northwest: Its Resources and Industries*. Southwest Pub. Co., 1938.

[4] K. J. Knutson, E. D. Fullenwider, *Seattle Public Schools*.

[5] Minutes of Pacific Northwest Regional Planning Commission, Boise, Idaho, 1938.

[6] Northwest Regional Council, Portland Oregon. *The Pacific Northwest: A Selected Bibliography, 1930-1939*. pp. 5-6.

[7] *Ibid.*, p. 7.

[8] *Ibid.*, p. 455.

of the basic problems of the Pacific Northwest.

2. To make available *at all educational levels* accurate and stimulating materials concerning the social, economic and governmental problems of the region.
3. To provide the machinery for conference and consultation among the advisory, research, planning and educational agencies concerned with the orderly development of the Pacific Northwest.
4. To foster coordinated research in the natural and human resource fields so that wasteful duplication may be avoided and new fields for constructive research may become more clearly defined.
5. To act as a clearing house for the interchange of bibliographic and other technical data of regional significance.
6. To make known the training required and opportunities available for career service in the various agencies of Federal, State and local government. To encourage the extension of sound public-service training facilities.
7. To assist by means of publication and grants-in-aid specific research of a highly significant character and primarily regional in scope.

These "objectives" were widely circulated throughout the schools in the Pacific Northwest. Some of the Council's publications that found their way into the "meaningful picture" of Northwest schools were: Pacific Northwest Regional Council; Men and Resources; A Study of Economic Opportunities in the Pacific Northwest, 1941; Pacific Northwest Problems and Materials, 1941; Pacific Northwest Resources in Outline, 1940; Soil Conservation in Outline, 1940; Forest Depletion in Outline, 1940; Portland, Oregon; The Pacific Northwest Council.

DEVELOPMENT OF STUDENT'S REGIONAL WORK MAPS

A very helpful publication of the council was the Economic Atlas of the Pacific Northwest. In the foreward to the second and larger edition published in 1942, John B. Appleton, Director Northwest Regional Council states: "There is no adequate substitute for informative well executed, accurate maps for the study of any area. They provide one of the most effective techniques for the presentation of physical, biological and economic data.

Inter-relationships between man and his environment can be readily visualized. These relationships are essential to the understanding of many community, state, regional, and national problems.

Most of the maps are designed to permit hand coloring, which will materially increase their value."[9]

To aid the student to utilize more fully this atlas and "fugitive" Pacific Northwest maps of different agencies, a series of student's regional work maps were developed in James Monroe Junior High School, Seattle.[10] The maps emphasize the regional resource relationship point of view. They give a visual picture of the "lay of the land," including the mountain ranges, peaks, plains, valleys and plateaus thereby presenting a simplified physiographic picture of the area covered. The "Legend Text" guides the student's thinking concerning climate and its relationship with other elements of the natural environment, industries, products, and other outstanding human uses of the area. This series was made for the States of Washington, Oregon, The Pacific Northwest and a Polar Centered World Climatic Map. The latter

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[9] *Economic Atlas of the Pacific Northwest, Second Edition.* Published by the Northwest Regional Council in cooperation with the Pacific Northwest Regional Planning Commission, Bonneville Power Administration, Portland, Oregon, 1942. Foreward, Second Edition.

[10] King and Fullenwider, Student's Regional Work Maps of the State of Oregon; State of Washington; The Pacific Northwest Region; Student's Polar-Centered Regional Work Map of the World. 18th Ave. N.W. and West 65th Street, Seattle 7, Washington.

gives the Northwest in the world setting of climatic regions.

RECENT RESOURCE-USE CONFERENCES

A recent (1951) two day conference on Conservation Education in the Public Schools of Washington was held at the University of Washington. It was sponsored by the Northwest Conservation League in cooperation with the College of Education, University of Washington.

The Seattle Public Schools sponsored a "Workshop in Secondary Education and Elementary Education," August 20 to 29, 1951. The section on "Conservation of Natural Resources" met for an hour and a half for five consecutive meetings. Teachers attending this section represented all grades throughout junior and senior high school. Resource-use speakers from the United States Forest Service, The Soil Conservation Service, Keep Washington Green Association, West Coast Lumbermen's Association and the University of Washington presented their views and materials. Each presentation was followed by questions, discussion and evaluation of materials presented. In these "buzz sections" the teachers indicated how and where they would use the information thus gained.

The use of "resource people" is receiving more study in order to increase the effectiveness of conservation education. The State of California's publication "Consultants and Speakers in Conservation," compiled by the Chief of Conservation Education, State Department of Natural Resources of the State is an excellent suggestion. This type of conservation aid is being developed for the State of Washington and will include a list of accessible out of state speakers and consultants.

RESOURCE-USE EDUCATION IN THE PRIMARY GRADES

As stated in the American Association of School Administrators Twenty-ninth Yearbook, the terms "conservation" and "natural resources" are concepts in themselves too difficult for children in the primary grades. However, such elementary understandings as the difference between poor soil and good soil and the fact that plants need good soil and enough water are well within the range of these youngsters. The science program of the schools of Spokane, Washington is cited as an example of good conservation practice in the primary grades.

At the very beginning of a child's formal school education the teacher has a definite responsibility to instil the attitude of the use of all school materials "without waste" as well as a sense of responsibility and protection of public and private property. Here the kindergarten and primary teachers can lay a solid foundation for later complex resource-use problems. The beginning of conservation education in the classroom may concern the use of the light switch and the water faucet, care of the blackboard, adjustment and care of window shades. The resourceful teacher will find opportunity every day to practice the concept of use without waste.

RESOURCE-USE EDUCATION IN INTERMEDIATE GRADES

"In grades 4 and 5 the term 'conservation' still is an abstraction difficult for children to grasp, but development can continue of the specific items out of which the broad idea of conservation of natural resources is to be forged. In grade 6, if careful preparation has been made, most youngsters will be ready to grasp the idea. By this time they should have developed enough basic concepts and gathered enough in-

formation to be ready to recognize that conservation is a major problem. To develop increasing awareness of the magnitude of this problem and to develop methods of solving it are the tasks of the remaining school year."[11]

Sixth grade pupils from two schools in Seattle were taken for a week each to nearby Camp Waskowitz last fall. The relationship of trees to lumber and of forests to soil erosion, water, industry and home use was made clear to them. They stated other values as a result of their camping experiences: "We learned to live together better." "We learned to like people we didn't like before." "We enjoyed trail blazing." "We learned how to plant seedlings, how to build a fire in the rain." Parent enthusiasm for the program was unanimous. Similar results were reported by other schools in other parts of the State. It is a safe prophecy, probably, that as this type of outdoor education becomes more widely known, parents and all others interested in the welfare of youth will support this type of education as an integral part of the school program.

RESOURCE-USE EDUCATION IN THE JUNIOR HIGH SCHOOL

Auburn, Washington Junior High School developed a class in Washington State Wildlife. Pupils and teacher made a survey of the types of animals, birds, wildfowl, and fish found in the region. The study of the habits of the area's fauna soon established a definite pattern, a chain reaction of relationships. The class was soon aware that a very fine balance of nature must be maintained if the wildlife of the region be adequately protected. A study of conservation methods, game laws, rules for safety and good sportsmanship grew logically and easily out of the survey. The final result was the organization of a junior sportsmen's club through which members were given opportunity to practice some of the conservation measures begun in class work and the outdoor survey.

Auburn and other junior high schools experimenting with similar types of outdoor education are building evidence in favor of schools obtaining grants of land or areas from seashore to mountains where the ecology of the region may be studied each year by the students.

RESOURCE-USE IN THE SENIOR HIGH SCHOOL

A growing conservation education practice in the Pacific Northwest where approximately one hundred million acres is best suited to the production of forests, is the acquisition by individual schools of a given number of acres of forest land. Into this laboratory go our students, not only with pencil and paper, but with shovel and seedlings, and a desire to be an active part of the preservation and perpetuation of one of our greatest natural resources. Every subject in the curriculum can be related to this school forest laboratory.

Lincoln High School, Tacoma, Roosevelt and Cleveland High Schools, Seattle have well demonstrated the values of forest projects. Are they the beginnings of a conservation education study that will soon be a part of all public school education?

RESOURCE-USE IN TEACHER TRAINING

Resource-use educational courses have been presented to teachers and administrators as part of a school system's "in-service" educational program. Field trips are an integral part of the course. These activities give teachers of all grades and subject areas information and inspira-

[11] Twenty-ninth Yearbook, A.A.S.A. p. 123.

tion to work on whatever phase of the resource-use problems that are within their respective subject fields and their students' understanding.

The following outline of an "in-service" course is an example of attempts to further extend and improve the teaching of conservation education in the Northwest.

1. Introduction and Organization.
2. The Forests; Their Importance and Treatment.
3. Save Our Soil; It Feeds and Clothes Us.
4. The Relation of Water Resources to Forest Management.
5. Pacific Northwest Hydroelectric Power; The Nation's Growing Power Giant.
6. Fisheries Conservation; Some New Dramatic Developments.
7. The Relation of Forest Management to Recreation and Wildlife.
8. Land Use Problems Related to: Grazing; The Use of New Crops, The Introduction of Use of Tracer Elements in the Soil.
9. Summary — Resource-Use Speakers' Panel; Teacher Evaluation Reports from Elementary, Intermediate, Junior and Senior High School Groups.

FIELD TRIPS

1. Forest: Logging Operations, Reforestation Methods, Nursery.
2. Soil: Demonstration Farm, Erosion Types, Strip Farming.
3. Industry: Pulp and Paper, Plywood, Shingles.

RESOURCE-USE UNITS

Resource-use education has been defined as "education for better living through the wise use of resources." Resources is defined to include all those forces and objects of the environment which people use to achieve their wants and satisfy their needs. Throughout America units of study designed to achieve this concept continue to be prepared for various grade levels.

The unit, "Using Our Land Wisely," was prepared by the curriculum department of the Seattle Public Schools. Consultants from the fields of art, audio-visual aids, health, home economics, language arts, mathematics, music, science, social studies, and the library worked together to plan and work out the unit for use in the intermediate grade. The committee was concerned chiefly with attitudes and behaviors. Outdoor education became an integral part of the study. The committee states: "Our concern is not only with what children *know*—but with how they *feel*. Facts are sterile things unless opinions and conclusions grow out of them; understandings and opinions are barren unless behavior is influenced." [12] [13]

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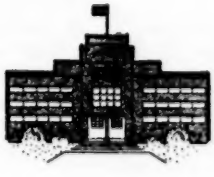
[12] *Using Our Land Wisely. A Resource Unit for Intermediate Grades.* Prepared by the Curriculum Department of the Seattle Public Schools.

[13] Further reference: (a) Margaret Thompson, Executive Secretary, Northwest Conservation League; Otis W. Freeman, President, Eastern Washington College of Education, *The Conservation of Northwest Resources.* Published by The Grange Cooperative Printing Association, 3104 Western Ave., Seattle 1; 1950. (b) William B. Greeley, *Forests and Men.* Doubleday & Company, Inc., Garden City, N. Y., 1951. (c) Seattle First National Bank. Quarterly Summary of Pacific Northwest Industries. Seattle, Washington.



Conservation Education in the Junior High School

By JAMES H. BLETHEN

GEORGE Lawrence smiled and raised his hand. This conservation business was easy, he thought. All you have to know is a few simple answers. When Mr. Fitch called his name, George gave the right answer straight from the book.

"The reason all the topsoil is lost each year," he quoted, "is because rain, falling on unprotected earth, causes a washing or scouring of the surface which floats away particles of soil. These particles form the tremendous acreage lost annually in silted streams, rivers, and dams." The pleased expression on the teacher's face was George's reward, and he sat down knowing that he had made a good impression.

After school that day, George and Mr. Fitch left the building together. As they walked along they noticed the road grader at work on the track around the football field. This job occurred annually. Mr. Fitch pointed out that the grader was removing some fifteen or twenty cubic yards of soil washed from the steep slope surrounding one side of the track and from the playground areas above the slope.

As they watched idly for a moment, George thought of the words he had used earlier in the day. "Rain falling on unprotected earth . . . acreage lost annually. . ." More to himself than to his teacher, he said aloud, "You know, we should do something to protect that hillside."

"What do you think could be done?" Mr. Fitch's question came so quickly that George was startled from his reverie.

"Well," he started lamely, "our class could do something. We could probably plant something on the slope that would hold the soil—that is, if the whole class worked on it."

On the following day George presented the problem to his entire class. Because they knew something should be done to remedy the situation, his classmates were enthusiastic. They decided to take action. With guidance from Mr. Fitch, they made a survey of what could be done to prevent erosion. From this survey they drew up a plan which was submitted to the student council. With funds allotted by the student council and with equipment provided and operated by the school system's maintenance department, and with many hours of work by classmates working cooperatively, erosion was halted and the appearance of the school vastly improved.

Now, actually, both George and Mr. Fitch had known that words about con-

● In December, 1951, the Journal published an article on San Diego's camping project. The practical effect of this project upon a school and a program is detailed in this article by James H. Blethen. He describes how conservation education can be used to stimulate interest in junior high school students and lead to practical results.

Mr. Blethen spends one half of his time as a teacher of science in Kearny Junior-Senior High School, San Diego, and the other half as coordinator of Thrift and Conservation Education for the city. He has been a member of the staff of the San Diego City Schools since 1939, except for five years from 1941 to 1946, when he was in military service with the U. S. Army Engineers.

servation repeated from a textbook were meaningless unless accompanied by action. George knew because he had spent one week at school camp as a sixth grader and another week as an eighth grader. There he had studied and practiced conservation. He had learned many things about rocks and plants, about streams and valleys. He had built trails, planted trees, built check dams, and practiced fire prevention. As a ninth grader he had already acquired a considerable knowledge of the meaning and practice of conservation. Mr. Fitch knew that words repeated from a textbook may be meaningless, for in his long teaching experience he had found that the words had to be followed by action in order to have meaning. Conservation education must become a part of the life of each child if it is to have any effect on his activities as an adult.

Conservation, and its problems, is close to all of us. This is particularly true in these days of rapid home construction. Before landscaping is completed, much valuable soil may be washed away from newly graded cuts and fills. Soil conservation is not just for the farmer. Forest conservation is not just for the rangers. Conservation is the wise use of natural resources for the benefit of *all* the people on a permanent and continuing basis. These resources form perhaps our second most sacred national trust, following only the trust of freedom and liberty that gives us the right to enjoy and use these materials and energies. As with any trust, we must guard, preserve, and use wisely the natural resources in our custody so that we can pass them on to future generations for their use, enjoyment, and conservation.

It is generally agreed that there is no sure-fire course in which all of the goals, as stated in the 1950 *Guidebook for Conservation Education*,[1] might be reached. Conservation education must be a part of each subject matter area. It must be presented in problems of increasing detail and difficulty at each grade level.

In the San Diego City Schools our junior high school program is outlined in the *Curriculum Guide—The Secondary Program*.[2] In the various subject areas of the program there are many references to conservation topics.

In science, seventh graders study the local natural environment. Units are centered in local plant and animal life and water conservation. In this way pupils learn about the ground cover of our coastal plain and foothills. They discover the fact that the semi-arid mesas in the San Diego area do not receive enough rainfall to provide for the water needs of the people.

In eighth grade general science, pupils study the sources and value of the world's resources and the exhaustibility of many of them. They also study plants and animals according to such geographical areas as plains, jungles, mountains, and arctic regions. Wildlife is studied and its preservation understood. Here also is emphasized the fact that many animals even within recent times have become extinct.

Ninth grade science specifically studies plant and animal conservation along with a study of the use and improvement of plants and animals.

In Industrial Arts, information pertaining to sources of raw materials is presented in all shops, particularly in the metal and wood shops. In wood shops, learning experiences include a knowledge of wood, its structure and growth cycles, lumber sources, processing and products. Here is one place where industry and state and federal agencies provide our classrooms with

[1] *Guidebook for Conservation Education*. California Department of Natural Resources in cooperation with the Department of Education. Sacramento: State of California, 1950.

[2] *Curriculum Guide — The Secondary Program*. San Diego City Schools, 1950.

the very best and most up-to-date materials, booklets, and posters.

Social studies, too, carry a heavy responsibility for teaching conservation. In the seventh grade social studies the spiral idea continues in following the immediate, concrete and functional interests of this grade level. Pupils at this grade level identify themselves with their immediate surroundings and groups. This course begins with the study of the pupil and his community and special emphasis is placed on the community's two critical conservation problems, forests and water. Pupils learn that the future of this community is dependent on storage of rainfall and importation of water from other sources.

Another area emphasized in seventh grade is the study of the unit, *Agricultural America in Relationship to World Food Problems.* This unit stresses the problems of supplying the basic food needs of our people. Soil conservation becomes increasingly important when pupils realize that America is expected to help provide food for the "have not" nations of the world. Pupils learn that many nations are much less fortunate than the United States in the possession of natural resources. They may see that necessity has forced the people of less fortunate nations to be much better conservationists than are Americans.

Eighth graders study American history and government. They learn to appreciate how natural resources have fostered the democratic spirit and have contributed to the growth of our country. They see that our natural resources are another heritage which must be conserved.

Ninth graders study world economic geography. Industry is shown as depending on raw materials which are distributed throughout the world. Some of these are exhaustible, such as petroleum and minerals; some renewable, such as soils, forests, and wildlife. They see the importance of wise use of the exhaustible resources, and of careful, long-range planning for the maintenance of a balance between the use and replacement of the renewable resources.

A part of the San Diego City Schools program of which we are very proud and in which we are probably doing our best conservation education is Camping Education. In this area we have separate camping programs and camps for elementary and secondary students. Elementary school camping is placed at the sixth grade level and the boys and girls go as a class group. The secondary program takes boys or girls from a particular grade (eighth through eleventh) and rotates the camping periods among the junior and senior high schools.

Camping stirs an emotional and spiritual response to the beauties of nature which is important to the development of proper attitudes toward conservation. In addition to the many desirable outcomes of camping, the following learning experiences in our camping education program are especially related to conservation:

1. The student develops a deeper understanding of the ways and means by which natural resources can be conserved.
2. Students practice conservation through activities such as repairing spillways, building check dams, establishing fish hatcheries and bird feeding stations, and planting trees.
3. They explore the surrounding countryside, which leads to important discoveries about plant and animal life, minerals and geological formation, geography and topography, map-making and map-reading, and Indian village sites.

All these experiences take place in the mountains that form our major watersheds, so many of these discoveries relate to our particular problem of water conservation.

Within the San Diego City Schools

there has also been developed a new handbook titled *Securing Our Future.* It is a guidebook for thrift and conservation education. It was developed to assist teachers and principals in emphasizing thrift and conservation education in the San Diego Schools. Its point of view is that thrift education should be encouraged throughout the entire program; that thrift education encourages the economical use of money, materials, equipment, time, and energy. As a part of thrift education, conservation is the thrifty use of natural resources.

Experience emphasizes the difference between knowing and doing. Having knowledge does not assure that one will act in accord with it. Though many can satisfactorily pass tests on laws governing the operation of motor vehicles the mark of one million traffic deaths shows the actual practice of these drivers. Wise schoolmasters know that many of the basic educational goals cannot be reached by knowledge alone. Knowing about conservation does not of itself necessarily bring about the "wise use" mentioned in the definition.

At every opportunity, the teacher and pupils must leave the classroom for the field. Read the book and learn the fundamentals to be sure; know what to look for; know some of the common problems and their solutions—then go outdoors to see what the problem is in your locality. Conservation should be taught against the background of the local setting and adapted in its details to local conservation problems and needs. Only when thus presented will conservation become a personal and moving force in the lives of boys and girls.

Field trips are not difficult even within one class period. There is only one secondary school in our system that is not within approximately two blocks of a canyon area. The students enjoy excursions. The teacher can show a minimum of two basic ideas, ground cover and erosion. With a little imagination he can cover much more, such for example, as the soil-holding qualities of different plants and different root systems, the balance of nature, the nature of food chains and other ecological relationships.

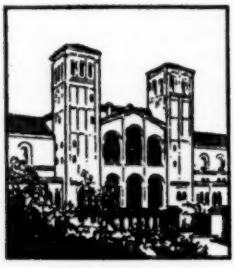
If transportation is available (and many school systems have buses that can be scheduled), longer trips may be taken. Nothing pays greater benefits, no matter what the subject area, than observation of the real thing in action. Modern sewage disposal plants are worth visiting. Aside from their necessity and benefits in a modern community, they are the source of a tremendous loss of minerals—minerals which are forever gone from the earth's surface. Under primitive conditions every atom of substance that entered into the composition of living bodies was returned in time to the air or the soil in the same area. Today, minerals from soils go to cities in the form of foods. Then sewers and sewage disposal systems carry them to streams and oceans where their value to man is largely lost. Some commercial fertilizer is processed from this source, but it is too expensive to return it to the farms and orchards. Instead it is used on lawns and flower beds.

The water storage areas and water treatment plants of your own locality are well worth visiting. Our schools recently completed a very satisfactory trip of this sort. Since water conservation is the main local problem, which cannot be shown in the real situation to all students, the trip was organized to include a school reporter and a school photographer from each secondary school. They were to be on a regular assignment from their journalism classes. They had a story to cover and a report to make. The city and county water agencies were eager to cooperate. The local press sent its own reporter and

photographer. These students spent the entire school day on this field trip. They were transported in city cars by men who knew the water situation. This trip resulted in excellent stories in the school papers, fine photographic displays in the schools, very favorable public relations with all cooperating groups, and two fine stories in the daily press.

There are also excellent opportunities to study and observe conservation principles on your own school grounds. That bank that washes onto the track each year would be a good problem. A sound plan presented to the right people and perhaps accompanied by offers of student cooperation and help probably would get action. Many new schools are being built on grounds requiring terracing for both buildings and for play areas and athletic fields. In most cases the complete job is contracted for. Here is an opportunity to watch the progress of the landscaping job. Borrow the plans and try to understand the layout for the job. This artificial solution to holding the soil in place can be related to occurrences in nature. If a rain comes before the soil is protected, relate what happens on the school grounds to the situation in an area after a bad forest or brush fire. Even ten or fifteen minutes out-of-doors may enable a teacher to drive home a point not at all easily understood in the classroom.

A practical program in conservation education may not seem very exciting or pressing, but certainly, it is an urgent need. The teaching of conservation must be carried on at all levels and in various subject areas. Separate courses in conservation in an already crowded curriculum seldom include more than a small number of students. The need is for repeated and frequent emphasis in many fields. This emphasis will aid in making our young people aware of the need for conservation and prepare them for "conservation conscious" adulthood.



Forestry Goes to High School

By ROGER CLEMENS

"AND the Lord God planted a garden eastward in Eden; and there He put the man He had formed. And out of the ground made the Lord God to grow every tree that is pleasant to the sight, and good for food; the tree of life also in the midst of the garden, and the tree of knowledge of good and evil."

How important trees have been to man and how they have served him through the ages is an integral part of the record of man and his civilization. From the beginning of time the trees, and in a larger sense the forests, have provided man with watersheds, prevented floods, protected soil from erosion, have been beneficial to man's health and his well being, and have enhanced his life with their beauty, offering him a shrine where he could commune with his God.

If it were not for our trees and our forests, our bountiful life could not be. We need only consider the treeless plights of China, India, and Asia Minor to realize how fortunate we are to have vast forest resources. Our forests are so important to our national welfare that without them we could not have successfully waged two world wars. Military experts estimate that we used sixty-five billion board feet of lumber to win World War II, and further, that if Germany had had adequate timber resources, her European fortress would have been well nigh impregnable. We must be determined that we shall take good care of our forests through sound conservation if our high standard of civilization is to endure.

The teaching of conservation, which is defined as the intelligent use of our natural resources, is a fundamental concept of forestry, and the basis of the course now being offered at Fort Bragg High School.

● **The influence of the immediate region upon the school program is illustrated in the program described by Roger Clemens in this article. It shows how government, private industry and education cooperate to meet the challenging problem of wisely using California's magnificent redwood forests. This program may well be instructive to those in other parts of the country where similar types of resource problems may be found.**

Mr. Clemens, now teacher of vocational forestry, Fort Bragg, California, High School, brings a wealth of experience to his position, having served as forester for both government and private industry in Arkansas and New Mexico and as an agricultural and range conservationist in California.

Situated in the world-renowned Redwood Region of California, Fort Bragg owes its existence and continued prosperity to the remarkable redwood. Fort Bragg is a lumber town. From its forests and mills have come millions of board feet of the very finest redwood lumber which have contributed immensely to the growth of California, and to the nation's prosperity. It was the redwood lumber from Fort Bragg that rebuilt San Francisco after the disastrous earthquake and fire of 1906, and it was the redwood lumber from Fort Bragg that played such a vital part in our victories in two world wars.

It was not until 1900 that very many Americans became interested or even cared about this nation's forest resources. The United States had such ex-

tensive forests, that because of their abundance, the early settlers often considered them an impediment to their progress—little realizing just how important these forests were, as they ruthlessly cut their way through them, using whatever wood they needed for their homes, barns,. fences, and for railroad ties or other purposes and destroying the remainder. Paul Bunyon and his mighty ax and three-mile cross-cut saw was a legendary hero of this era of forest destruction. Trees at this time were considered a one-time crop—and when harvested, the land was burned or cleared for other more valuable crops.

In time a few conservation minded men in high positions realized what was happening to the nation's forest resources, and foresaw the terrible consequences if the wanton destruction of these resources were to continue unabated.

In 1876, the Congress of the United States passed an act authorizing an inquiry into the forest situation of the United States and the formulation of a forest policy, and in 1877 a Forestry Commission was established. In 1891, Congress empowered the President to set aside forest reserves from the public domain. The first two American forestry schools were established at Cornell University and the Biltmore Estate in 1898. The Society of American Foresters was established in 1900.

With the establishment and growth of national forests, much of the early forestry work was carried on by the United States Forest Service, an agency created by Congress to administer the national forests. The University of Michigan, and other universities started forestry schools. The lumber industry became increasingly interested in forestry. Forestery came to be established as a profession.

In 1941, a significant event happened with the establishment of the "Tree Farm" movement by private industry. A tract of cut-over timber land owned by the Weyerhauser Lumber Company in Washington, was dedicated for the perpetual growth of trees as a crop. In the ten years that followed more than 2500 other tree farms, embracing more than two million acres of forest land were dedicated throughout the United States.

Along with the Tree Farm movement were other movements that marked a decade in which more progress was made in forestry than in the preceding fifty years. The public became conscious of such organizations as "Keep Washington Green", and "Keep California Green and Golden". A noteworthy project undertaken by the lumber industry recently is a ten million dollar reforestation program in Oregon, the biggest program of its kind in history.

Another recent development was the establishment of Redwood Regional Conservation Councils throughout the redwood region. These councils are made up of lumber men, foresters, city officials, prominent business men and others who are interested and desire to improve the conditions of their communities, particularly those relating to lumbering and forestry. Through the instigation of the Redwood Regional Conservation Council, forestry courses were added to the curriculum of Fort Bragg and Willits High Schools.

Educational Sociology concerns itself with the relationship of the school to the community. The school's first and most important task is to serve the community. If the community is supported by forest industries, and if a large number of the students will eventually work in the woods or mills or some other phases of the industry—or if they seek employment in other businesses that are dependent on the forest industries—why should not they receive some basic training in forestry and lumbering? As future citizens of the community, it will

be their responsibility to conserve the forest resources which are so important to the community, the state and the nation.

A high school forestry program needs to be well rounded, somewhat technical but not beyond the capabilities of high school students. If it is to be a vocational program it must be practical as well, preparing the students to do specific tasks. At the completion of the course not only the students but also their future employers and the community should have profited.

There are many definitions of forestry. Lexicographers inform us that our words, "forest" and "forestry," were derived from the Latin *foris* or *foras* which meant "outdoors". We also learn that there was a low Latin expression *forestis* which was used to describe land reserved for the chase.

Forestry, as practiced in Europe many centuries ago, was concerned primarily with the production and maintenance of game for the royal hunt. When the scarcity of timber became evident in Europe, the growing of continuous timber crops changed the primary task of forestry to such an extent that game production was of minor importance. During the latter period, forestry as a science finally emerged in Germany. Historians set this date as 1863 when the first forestry experiment stations were established in Germany.

Today forestry, which from the beginning, was a combination of many sciences such as botany, chemistry, physics, biology, and mathematics, is recognized as a division of science occupied with the continuous production and management of forests and the promotion of their beneficial use by man. But forestry is more, for it is also a business, an art, and a public policy.

In developing a high school forestry program, one must consider the needs of the community, the facilities at hand, the background of the students, and many other aspects. A vocational course would, of course, be restricted to forest communities, and general introductory forestry courses could be offered in almost any community. The latter type of course would serve to acquaint the student with forestry in a general way, and with particular emphasis upon conservation. Such a course would not entail a profound knowledge of every plant and animal of the forest nor would it involve any of the more complex phases of forestry. This course could well be a required subject for every secondary student in forest communities.

In order to develop a vocational forestry course it is desirable that the students have some background in woodsmanship, that they are interested in forestry, and that they are seriously considering forestry or lumbering as future occupations. A farm boy who has part of his land in woodlot would benefit from a vocational forestry course.

The school should have a forest or demonstration area where the students may learn the practical aspects of forestry. This tract should preferably be owned by the school, but satisfactory agreements can usually be worked out for the use of privately owned forest land for this purpose if it is not possible for the school to acquire such a tract. Considerable care must be exercised in the selection of a good representative school forest, which must be readily accessible, so that the students may be transported to and from the forest quickly and easily.

On the school forest the students will learn the fundamentals of silviculture, mensuration, and the other branches of forestry. They will observe the interrelation of plant and animal associations of the forest, and will understand how each member of the forest community is dependent on the other members. They will note how the forest builds up

soil, stores water which it gradually releases when it is needed by man. They will see the manifold influences of the forests upon civilization, and may even discover new ways in which the forest benefits man.

The students will learn how trees grow, how to accelerate their growth, and how to improve their quality. They will learn how to protect the forest from the ravages of fire, insects, and disease. They will learn proper methods of harvesting the forest crop to insure the continuous production of future crops.

Basic skills such as running compass and tape surveys, cruising timber, marking timber, scaling, locating logging roads and fire trails, planting trees, and fighting fires are among those which may be taught the embryo woodsmen on the school forest. In learning these skills, they should become proficient in the use of the staff and pocket compass, the Gunter's chain, abney level, biltmore stick, ax, crosscut saw, and fire tools. Time is the only limiting factor in what may be accomplished on a good school forest.

In addition to learning forestry in the woods and the classroom, the student should learn something about the manufacture of forest products. This can best be accomplished by conducted tours through lumber mills, pulp mills, and other plants that manufacture forest products. To complete the picture the student should study the distribution of the products at the wholesale and retail levels. Visits to retail lumber yards will be helpful in teaching this phase of the course. The student, upon completion of the course, will have a broad picture of forestry and forest industries, for the two go hand in hand.

In starting its forestry program, Fort Bragg high school was blessed with having many benefactors in addition to the good will and support of the townspeople. The Union Lumber Company was particularly generous in offering much material aid including portions of their timber holdings for use as a school forest. The company will play a vital part in the program by training the student in various operations in their woods and plant, including scaling, dry kiln operation and grading lumber. Student projects will be worked out in cooperation with the company.

The California State Division of Forestry has also given invaluable aid to the program in offering a tract for the school forest and in helping to start the school's arboretum. In addition the local officials of the Division will train the students in the latest methods of fire protection, insect and disease control, in silviculture practices developed by the State, and other phases of forestry.

Considerable assistance has been rendered by the Little Valley Lumber Company, Caspar Lumber Company, and Masonite Corporation. The United States Naval Reserve Electronics Unit in Fort Bragg furnished four walkie-talkies for the use of the class. The California Redwood Association and the Redwood Regional Conservation Council have made outstanding contributions to the success of the course and are among its most active supporters.

Excellent literature, motion pictures, slides, film strips, and other training aids have been furnished by the American Forest Products Industries, Inc., the West Coast Lumbermen's Association, the Western Pine Association, California Division of Forestry, the U. S. Forest Service, California Redwood Association, Southern Pacific Company, Caterpillar Tractor Company, California Division of Mines, and others.

Overseeing and guiding the program are Roscoe Lawson, District Superintendent of Schools, whose forethought and deep seated interest in forestry and conservation brought about the establishment of the course, Professor Eman-

uel Fritz of the University of California, who is often referred to as "Mr. Redwood", whose encouragement and advice were indispensable in getting the course underway, Ben Allen, Chairman of the California Redwood Association, Vernon S. Nelson, Principal of Fort Bragg high school, Russell Johnson, executive vice president of Union Lumber Company, and others. Their active interest and support have stimulated the program.

The true value of forestry courses in high schools is difficult to evaluate. Such courses can and will give the student a better understanding and appreciation of one of America's greatest and most important natural resources — her forests. They will help train him for a career in forestry, lumbering or allied industries, where more than two million Americans are now gainfully and happily employed. The courses will fulfill one of the primary purposes of secondary education by preparing better citizens for tomorrow.

In a recent appraisal of the Forestry program at Willits and Fort Bragg high schools, J. C. McClellan, Forester for the American Forest Products Industries, made the following comments:

"Inasmuch as American Forest Products Industries has as one of its major objectives the education of American youth in the basic principles of forestry, we have viewed with intense interest the forest education work being done at the Fort Bragg and Willits high schools. This is definitely a step in the right direction and should be encouraged by every possible means.

"Although more than 85,000 schools in the United States are using our forestry materials, we fully realize that, even in these schools, the use of our materials without forestry backgrounds does not adequately fulfill the need.

"The job being done at the Willits and Fort Bragg high schools could well set the pattern for the nation. With trained foresters teaching forestry in all of our high schools, I am sure that it would not be many years before many of our forest conservation problems would be solved. The future of our forests is largely in the hands of the children of today and if we can get trained foresters to teach them the forest will be in capable hands."

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A Conservation Education Program at Chico State College

By GLENN KENDALL AND STAFF

● From February 21-23 the Third Annual Conference on Conservation takes place at Chico State College. The February issue of the Journal is planned in relation to this important statewide meeting. Because of the growing recognition of the importance of a college serving the needs of its region, the faculty at Chico State College under the leadership of their new President, Glenn Kendall, are assessing the resources of the area. They wish to know what the College can do better to meet the needs of all the people in the region. The Journal is pleased to present the results of their thinking to date.

INTRODUCTION

Any phase of a developmental program in college is always in the process of "becoming." The conservation program at Chico State College is certainly no exception to this basic principle. Like all other important programs at the college it is in the process of changing and becoming more adaptable and serviceable to the people's needs. Chico State College serves the State of California, with emphasis upon the northeastern part of it, to assist in improving the quality of life and living of the communities and of the people within its sphere of influence.

This article deals with that phase of the college program which may be called Conservation Education. A group of faculty members have explored in discussion what should go into it. The ideas developed from this discussion make the region itself the central focus of this article. Different staff members have written brief descriptions about the region and its people.* From these have come some implications for teacher education and community life. The faculty of this college accept as basic philosophy that "education is a matter of time and place." Specifically, a conservation education program at Chico State College should be in terms of the region and the people it serves, and in terms of now and the future.

THE GEOGRAPHY OF THE AREA

The portion of California served by Chico State College presents marked geographic contrasts even to the casual observer. An east-west cross section of the area reveals the lofty Sierra-Cascade Ranges and their western foothills, the valley floor of the northern Sacramento River, and the foothills and summit areas of the Coast Ranges.

Both climatically and from an agricultural viewpoint this contrast of mountain and valley terrain affords great diversity. The western ranges of the Coastal Mountains serve as effective barriers to winds moving inland from the Pacific Ocean, with a consequent "rain shadow" effect on precipitation, especially on the eastern slopes of these ranges. The western portion of the val-

Staff members involved in writing this article are: Dr. Margery S. Anthony, Assistant Professor of Biological Sciences; Dr. George Brower, Assistant Professor of Sociology; Dr. Glenn Kendall, President, Chico State College; Dr. Homer J. Lowe, Professor of Biological Sciences and Education; Dr. Fred R. Neumann, Professor of Geology; Mr. Bruce Ogilvie, Assistant Professor of Geography; and Dr. Lew D. Oliver, Professor of History.

ley receives less rainfall than the eastern section.

In the valley, agricultural production grades from grasses and grains less demanding of water in the western area, to crips better grown under more ample supplies of water in the eastern section. Throughout the valley irrigated fields produce such crops as rice, sugar beets, beans and alfalfa. Orchard production is noteworthy, consisting of a variety of fruits and nuts such as peaches, apricots, oranges, almonds, walnuts and olives. Various centers of production for these crops have developed as a natural result of marketing the valuable produce.

In the mountain areas of the northeastern counties, fields give way to forests, and lumbering assumes the dominant role. Some mining activity is to be found, also. A popular use of the higher land is for recreation. State and National Parks and Forests afford opportunities for thousands to vacation in the cooler Sierra and Cascades while the summer sun warms the valley floor. Hunters, fishermen, and winter sports enthusiasts avail themselve of the many facilities in the region.

The contrasting features of northeastern California present a rather well balanced geographic region. On the one hand the valley provides agricultural commodities and serves as a natural through way for transportation routes, while the mountainous area provides forest products and serves as source area for irrigation water supplies.

THE NATURE OF THE AREA AND THE DEVELOPING ECENOMIC PATTERN

Northeastern California is characterized more by its physical diversities than by its similarities. No other region in California has within itself more topographical differences. The southern part of the region of northeastern California is a part of the central valleys. It includes the broad fertile valley of the Sacramento and its tributaries, such as the American, the Feather, the Bear, and the Yuba Rivers. As one travels northward up the Sacramento the mountains to the east and to the west encroach closer and closer, and the foothills rise more abruptly from the valley floor. Clumps of valley oaks appear along the borders of the many rapidly flowing creeks. The valley narrows rapidly north of Chico until at Red Bluff there is no longer a valley floor. To the north of Redding the river rushes rapidly down from its source at the base of Mount Shasta.

After one crosses the summit along the flank of Mount Shasta and Black Butte, one descends the Shasta River across a high plateau to the confluence of the Shasta and Klamath Rivers. Then one rises rapidly in the Siskiyou Mountains until reaching the state line of Oregon. Thus the dominating feature in traveling northward is the Sacramento River, but for over half its course it flows through hilly and mountainous terrain.

To the east of the Sacramento Valley are the Sierras and the Cascades. The Sierras are to the south of the Feather River and rise abruptly from the valley floor to reach high elevations. The Cascades to the north of the Sierras consist, on the contrary, of plateaus and volcanic peaks. These plateaus have moderately fertile soil which may be used for limited forms of agriculture. The isolation and relatively short season tend at present to restrict the agricultural possibilities.

West of the Sacramento Valley are the coast ranges. These ranges are less clearly defined than the mountains to the east. Even though they are lower in elevation, they are much more heavily wooded. Lumbering is highly important in the Sierras and the Cascades, but

plays an even more vital role in the economy of the coast ranges.

These geographical characteristics give to northeastern California certain unique features. It is still a relatively unexplored region. Since it embraces an area larger than the state of Ohio, it will become more and more important in the life of the people of California. It is still sparsely populated in a state with a population of almost 11,000,000. This region assumes tremendous importance if California hopes to find the resources to give her millions a high standard of living.

THE PEOPLE OF THE AREA

In conservation we are concerned with the number of people in the region, their rate of increase, their mobility, the length of time they have lived in the area, the age of the area itself, and the basic system of beliefs which motivates the behavior of individuals.

The population of northeastern California is definitely increasing. The population on the West coast is increasing more rapidly than most other sections of the country. The population of the country and the world is increasing as medical science develops and is put into practice. As more emphasis is placed on preventive medicine and sanitation, there is the certainty that there will be more people to feed in northeastern California as well as in the rest of the world.

We are already fully aware of the fact that some types of food, such as meat, are less abundant than they have been in previous years. Taking meat and other protein foods out of the diet will result in a lower quality diet. When the pressure of the population on the land increases, foods which can be produced in greater quantity on the same acreage replace high protein foods so that the quantity of the diet remains more or less constant, but the quality of the diet is reduced. This is certain to affect the physical quality of future Americans.

SOCIAL ORGANIZATION

Any attempt to solve the conservation problem will depend, in a large part, on the degree to which the people of northeastern California can operate effectively in groups. The psychological unity or degree to which people identify with their communities and neighborhoods in northeastern California, will determine the degree to which they are willing to work cooperatively to conserve their resources. It takes time and effort to develop a sense of belonging or "we feeling." The communities in northern California are relatively young. Many of them have new members coming into them from out of state or elsewhere in the state. Some of these individuals have not lived together long enough to develop a strong "we feeling." Some of the communities of northeastern California are growing rapidly, and when they reach a certain size they may split up into sub-groups, in terms of special interests. Psychological bonds or ties in communities in this stage of organization may actually become weaker.

A final factor concerning the effort toward conserving resources is the basic system of beliefs or values which motivates people to action. Northeastern California is regarded by many as an area of abundant resources. It is regarded as having an endless source of supply. As long as people think this is true, the fact that the supply is not endless has little bearing on their behavior in conserving resources.

Among the many aspects of a people's basic system of beliefs or values is their particular concept of private property. As long as they believe that ownership of resources implies use of those

resources as they please without any social obligation to fellow members of their community, region, or world, group endeavor to conserve natural resources seems somewhat remote. This is especially true since landowners must be convinced to conserve land and other resources for future as well as present generations.

These are some aspects of the people of northeastern California that must be taken into consideration in teaching conservation.

THE WATER, SOIL AND MINERALS OF THE AREA

Over so large an area (28,500 square miles) as we serve, there are many types of bedrock, many varieties of plant associations, and considerable climatic differences resulting in many soil types. In general, the best soils are in the Sacramento Valley, next best in the foothills, and the poorest are found in the mountains and on the lava plateaus. Soil erosion and soil depletion are not yet serious, but both are known and should be controlled now before the situation worsens. Overgrazing, deforestation, and poor agricultural practices are contributing to soil loss and soil injury.

Water is the number one problem in California. Northeastern California is relatively fortunate in having much more water than the southern areas. As population increases and agriculture develops, the demand for water will increase. It is now necessary to see that our streams and water supplies are not polluted with sediment from our lands, sewage from our towns, with wastes from our mills and factories, or tailings and toxic waters from our mines. Too many wells must not deplete our subsurface waters. Wise use of this resource requires the cooperation and intelligence of all the citizens of the area.

Intelligent handling of soils and water will permit us to use and reuse them for many, many years, but minerals once extracted from the earth and used by man are, in most cases, soon lost. Better mining methods, more efficient refining, wiser use, and increased use of scrap materials will be required. The air and oceans are now sources of mineral matter and their use is being extended. Substitutes are needed, such as solar energy for our oil, gas, and coal. Cheap and abundant minerals are being substituted for expensive and rare ones. Plastics are being made from cheap and plentiful common minerals.

In our region, gold dredgers are still at work destroying good soils by converting them into rock piles, but their day is probably limited.

Minerals, since they are non-renewable, require our wisest use.

THE FLORA AND FAUNA OF THE AREA

Topography and the resultant climate of our region account for its original pattern of valley grassland, with scattered oak trees, foothill woodland of digger pine and blue oak; and the mixed conifer forests of higher altitudes.

In the valley, cultivation and grazing have long since eliminated all of the native nutritious grasses; such aliens as wild oats, foxtail, yellow star thistle, wild radish and filaree are now the most evident plant life on cultivated areas and grazed hillsides. With the warm wetness of spring large splashes of yellow, blue, purple and white appear over the countryside as beds of goldfields, brodiaeas, poppies, lupines, owls clover and valley-foam follow in quick succession. Jack-rabbits, pocket gophers, Norway rats and meadow mice forage for their food while meadowlarks, blackbirds and white-crowned sparrows wing through the air. Some of this valley land is excellent for irrigated crops;

the higher parts of it are used for rangeland.

Where creeks from the hills fan into the valley dense canyon growth of live oaks, bay tree and California buckeye gives way to the sycamore, Fremont poplar and valley oak, all heavily hung with wild grape vines. The skunk, raccoon, California ground squirrel and white-footed mouse enjoy Nature's generous larder along these streambanks, as do also the titmouse, the garrulous scorn woodpecker, scrub jay and California quail.

The digger pine-blue oak belt includes occasional bushes of manzanita, buck-brush, poison oak and redberry — as well as a good grass cover. It is a favorite hideout for the coyote, gray fox, brush rabbit and ubiquitous California ground squirrel, while the many food plants are visited by the wren-tit, thrasher and goldfinch. The porous drainage of foothill regions gives no opportunity for development of rich carpets of wildflowers but such individual gems as indian pink, several larkspurs and mariposo lilies can be found for the looking. The main use of this zone is as rangeland since the trees are too scrubby to be of commercial value.

Above 2000–2500 feet the majestic yellow pine becomes dominant, accompanied by Douglas fir and incense cedar, forming a shady forest which is the preferred habitat of deer and the tree squirrel. Birds particularly associated with these conifers are the purple finch, vireos and many kinds of saucy little warblers. Such shade-loving wildflowers as fritillaries and indian warrior may be seen in April and May. Since sugar pine, yellow (or ponderosa) pine and Douglas fir are three most important timber crops this biotic community is the heart of our lumber industry. Few of the trees of higher altitudes are much used, although red fir is coming into the market now with newer methods of wood utilization.

As one ascends in altitude above 5000–6000 feet red fir and lodgepole pine soften the rocky landscape. These forests harbor the pine squirrel, several kinds of chipmunks and the stealthy weasel. The golden-bellied marmot prefers open rocky places. Characteristic birds are the blue-fronted jay, western tanager, and several kinglets. Wildflowers include the snowplant, mule-ears sunflower, pentstemons and asters. Most of the mountain meadows serve as summer pasturage for sheep but a few spongy areas, yet undisturbed, are crowded in July with blooms of paint brush, lupine and Queen Anne's lace.

Approaching timberline one passes through the highest zone of trees where the mountain hemlock bends gracefully under the weight of snow, in company with the silver and white-bark pines. The cony, Townsend's solitaire and hoarse-voiced Clarke's Nutcracker are the most common animals here.

On the dry eastern slopes of the Coast Ranges, and elsewhere in the mountains wherever openings have been made by fire or other disturbance, the much-maligned chaparral takes over. These spinescent, evergreen, small-leaved and densely-thicketed shrubs include species of buckbrush, manzanita, wild cherry and dwarf oaks. Their major service to mankind lies in catching and holding some of the rainfall, thereby preventing serious soil erosion.

IMPLICATIONS FOR CONSERVATION EDUCATION FOR THE AREA

Out of these brief descriptions of northeastern California one tends to get a picture of conservation education for the college serving the area. This program, to be effective, needs to take into account the specific area, the activities of the people, and to a very great extent

the ambitions and hopes of the people who live here. A conservation education program for the college, then, takes into account at least two important phases; first, a basic conservation "attitude" running through many parts of the general education of the college but sufficiently direct at spots as to ensure an understanding of the implications for good living in the region. In these various courses acquaintanceships of all the students of the college with the resources of this country and our region is of great importance. Special attention is to be placed upon study of the resources of this area. Emphasis on the conservation of our non-renewable resources should be developed by giving all students an understanding of how these resources have been formed. For example, without some special information on soil formation a student is not able fully to appreciate the seriousness of the problem of soil erosion.

A similar approach may be used for the resources which may be renewed — the plant and animal resources. Local Federal and State projects form an excellent basis for studies in this area. Resource men from these projects know their work thoroughly and are brought in as special speakers. Field trips to their projects are basically a part of this study.

The second phase of this program should be concerned with more special pre-service and in-service education of teachers. At the pre-service level emphasis is given to the materials and methods which would be appropriate for each level of maturity of children and youth. For the in-service group the conservation programs have more meaning if intelligent use is made of projects in their home communities. Oftentimes these resources at the home community level are so important to the area that the people are either directly or indirectly supported by them. Misuse of such resources may mean the destruction of the means of support of these people. For example, if lumber companies ruin the lumber resources of the area, cities and communities may be destroyed and complete dislocation of an area may result. In many ways conservation education can be more vividly presented in the in-service program than in any other field.

In the development of the pre-service and in-service programs the college staff view themselves as a part of the total team in association with other people in the region. Biologists, geologists, conservationists, community leaders and other people in education study together the community to be served and how best to organize that area into a course of study. An example of an in-service program was the one given last summer in the Mount Shasta area. There, under the leadership of a college staff member, an in-service program was carried out which included, in cooperation with others of the area, a study of the General Valley Project and the place of the Shasta Dam and region in such a project. It included a study of soil types and use of the soil of the region, a study of the McCloud Lumber logging area, a study of the United States Agricultural tree nursery program, a study of the fish hatchery and a study of the fire suppression program of that region.

Implicit in the discussion above is the dominating thesis that a conservation program should grow out of the needs of the people and the resources of the region. The college faculty and the people working within the broad purposes of a college program can and should cooperatively determine both the content of programs and the means whereby they should be developed.

New Horizons in Oceanography for General Education

By AUBREY HAAN

● The true significance of the Pacific Ocean to California has probably not been properly appreciated. That there are fascinating "New Horizons" in exploring the rich resources of the oceans is illustrated by Aubrey Haan's captivating article.

Professor Haan is a member of the staff in elementary education at San Francisco State College this year, having come directly from the University of Hawaii, where he began his study of oceanography and exerted influence in translating findings into useful educational materials. Prior to his work in Hawaii, Dr. Haan was principal, University Training School, University of Utah. He received his doctorate in elementary education at Stanford University in 1941.

THE study of the oceans is the most difficult of all the resource studies. Yet the oceans are so familiar that their complexity dawns upon us only when we try to solve the problems of their life and movement. Geography, zoology, botany, algology, bacteriology, chemistry, physics, geology, mathematics and astronomy in profound interrelation must be brought to the task of understanding the dynamic system of the seas, as science only well begun. The scope of the problem is partially evident from the immensity of the areas covered by the oceans, some three-fourths of the entire globe, constituting an area available for life more than three hundred times as great as that on all land areas. The complexity of the problem is illustrated by the subtle responses of oceanic life to the conditions and changes in the chemistry, temperature, fertility and movement of the seas, varying with depth, latitude, winds, and the distribution of land masses.

SIGNIFICANCE FOR SCHOOLS

For many island or coastal communities the sea meant food, travel, recreation, and some of the mystical qualities of life itself. This is still true of many island communities: it was true of the Hawaiian Islands in the days when the ocean was well integrated in the daily routine of living. For the most part California turns its back upon sea, but the ocean must become more important economically to this coast and to the earth's population generally. In this sense it becomes the stuff of general education.

The aspects of oceanography of direct or potential significance are numerous:

1. The effect on weather.
2. Relation to navigation.
3. Possibilities of developing planktonic food resources.
4. Development and conservation of world fisheries.
5. Exploration of other new food supplies.
6. Experimentation with heat engines utilizing thermal differentials between top and bottom waters.
7. Geophysical research in the effects of volcanoes and earthquakes under the sea upon the safety of island and coastal communities.
8. Utilization of water strata for sending relief signals.
9. Beach control and harbor maintenance.
10. Possibilities of redistributing fertilizer salts lost in depths below the photic zone to support additional plant and animal life.

We may come yet to the seas looking for food for a world population which will apparently be doubled soon after the turn of the century. If the need existed now, we would not be ready with sufficient knowledge of the oceans; in many respects the sea is a great storehouse, but it is a storehouse to which we do not have the key.

DYNAMIC SEAS

The ocean is constantly in motion, now slow as the creeping of the Mediterranean bottom waters down the coast of Africa to the Antarctic, now as swift as the Gulf Stream, a veritable river in the sea running as fast as three or four knots an hour. The ice cold waters of both the Arctic and Antarctic oceans move into the deeps and bottoms of all the oceans, traces reaching the opposite hemispheres. The Atlantic water passing into the South Atlantic off Africa comes from the Labrador Sea, the southeast coast of Greenland and from the Straits of Gibraltar. South Atlantic water enters the Gulf Stream and moves north as part of the current that later washes the shores of northwest Europe. Some Indian Ocean water moves into the Pacific, and the high saline waters of the Red Sea can be traced to the southern limit of the Indian Ocean, possibly to the Antarctic. In the Southern Ocean there is a massive movement of water some three hundred to eight hundred feet deep called the West Wind Drift. Beneath this is a layer from the North Atlantic moving south and east. The intermediate water around the Hawaiian Islands is formed off the coast of Japan. Along the coast of California flows a wide, sluggish current some four hundred fifty miles in width, moving southeast from the area of the Aleutian Islands and making up the continuation of the Aleutian Current. Beneath the surface current another current of Equatorial water flows north close to the coast at depths below four hundred feet during the months of May, June and July. Later in the season—November, December and January—another counter current, the Davidson, runs north as far as 48°. Analogous to El Nino off Peru, the Davidson does not have the same disastrous effect.

This is only a glimpse of the amazing complexity of the horizontal movements of the seas. There are also turbulences, upwellings, vertical movements of the water from: 1) separation of currents in the sea or from their pulling away from continental shores, 2) changes in surface density because of evaporation, and 3) the sinking of cold and heavy surface waters such as occurs all around the Antarctic continent. The equatorial and Humboldt currents are examples of currents with which major upwellings are associated. The Red Sea in winter is an example of changes in surface density because of evaporation. Along the California coast there are three areas of intense upwelling: one off Lower California at about 20°, another at 35° near Pt. Conception and a third near 41° near Cape Mendocino. Off Monterey Bay three periods of the sea are important in their effect on climate and sea life. The first period lasts from November to about the middle of February when the comparatively warm Davidson current flows north. From February to the end of July there is an upwelling when colder waters are brought up from depths of around 200 meters. During the oceanic period from the end of July to the middle of November the California current, relatively cold, holds sway. Examples are found along both the California coast and west coast of South America where the pulling of the current away from land brings up masses of cold water from the depths.

These upwellings of the oceans are particularly interesting to the coast

dwellers as the upward movement of the water brings up fertilizer into the photic zone. This photic zone contains the depths where the sunlight reaches strongly enough for photosynthesis by the one-celled plants. In this zone the fertilizer can be utilized by plankton which in turn supports a rich fish population. These upwellings also markedly affect the climate of adjacent areas.

In its composition and temperature the sea is also variable. Most of the oceans show a salinity between 34 and 37 grams per liter. Salinity is highest near the equator, lowest near the poles. Water areas such as the Baltic show less than 10 grams per liter, the Red Sea—where there is rapid evaporation—as much as 46.5 grams per liter. These differences in salinity give rise to both vertical and horizontal movements in the seas. Dissolved in the sea is not only common salt, its major constituent, but also ions and compounds of magnesium, sulfur, calcium, potassium, bromine, carbon and thirty-eight other elements, in addition to the dissolved gases like oxygen and nitrogen.

As to the life of the sea, the whole sea, from Antarctic ice to Arctic ice, from the enclosed bays and continental margins to mid-ocean, is a great meadow, broad and deep. This meadow blooms suddenly in northern waters with the return of the sun in March and April and dies down in October as the sunlight grows weak. In some places the meadow is lush, in others thin and weak. The grass of the sea, the microscopic one-celled plants, the phytoplankton, reach down as deep as light is strong enough for photosynthesis, 200 meters in the clear water of the tropical ocean, less in the northern waters.

The plants of the sea carry on the same processes as those on land. With the aid of sunlight they combine water and carbon dioxide to form carbohydrates. Using other compounds from the ocean to meet their needs they build proteins, fats and other compounds of life. Like other plants they need fertilizer, but in the sea probably more commonly than on land, the growth of plant life is stunted by lack of these fertilizer salts.

The drifting grazers, the small crustaceans, the copepods, ostracods and euphasids, feed on the microscopic plants. Preying on these are the small predators such as the arrow worms, the larger crustacea and others. These in turn are the food of still higher orders. This is the ocean's pyramid of life.

The fertilizer salts in the photic zone are quickly used up by the plants. The waters below this, two or three hundred meters down, are rich in fertilizers. It is only where deep waters rich in phosphates and nitrates well up to the surface that the plants flourish in greatest numbers. At these spots are also found the greatest number of grazers, the greatest number of predators and the greatest fisheries.

The remaining partially unexplored fisheries of the world, the western coast of South America, for example, occur in areas of major upwelling of the ocean waters. One of the areas between the equator and five degrees north; upwelling there is caused by the counter equatorial current. Upwelling occurs around the Antarctic continent because of the sinking of heavy surface waters. It occurs along the coast of South America because of the pulling away from land of the Humboldt current—this being caused by the rotation of the earth itself. This is also true of the west coast of Africa.

All this is but a suggestion of the infinite complexity and subtlety of the oceans.

WHAT IS BEING DONE?

It would be difficult to do justice to the efforts which have been expended

already in every part of the world to solve the physical and biological puzzles of the oceans. From the journey of Pythias in the fourth century B.C. to Iceland and the Arctic ice pack to the modern trips of the "Atlantis", a ship with two laboratories, a sonic sounding machine and thirty thousand feet of dredging wire, there is a history of slow but accelerating accumulation of data on the broad front of oceanic problems.

In the United States, the Naval Hydrographic Office, the Coast and Geodetic Survey, the Fish and Wildlife Service, the Scripps Institution of Oceanography at La Jolla, California, the Woods Hole Oceanographic Institution, and the Bingham Oceanographic Laboratory to mention only a few of the organizations, are all concerned with aspects of oceanographic research. The Pacific Oceanic Fisheries Investigation, a project of the Fish and Wildlife Service, started in the central Pacific in 1949, is engaged in an extensive investigation of the ocean currents and plankton distribution related to biological productivity, the distribution of commercial fish in the central Pacific and the development of new fisheries methods designed to meet the conditions of the open ocean and the habits of its fish, especially tuna. The tardiness of technological development in fishing methods is surprising when compared with other resources. There have been many other investigations.

In Sweden, the Hydrographic Biological Commission; in Norway, the Geophysical Institute and the University Biological Station at Drobak; in Denmark, the Committee for Fisheries Investigation and the Study of the Sea and the Permanent International Council for the Study of the Sea; in England, the Marine Biological Association of the United Kingdom; in France, the Oceanographic Institute in Paris; in Monaco, the Oceanographic Museum; in Italy, the Naples Zoological Station; in Russia, the All-Union Scientific Research Institution of Marine Fisheries and Oceanography, and the Polar Scientific Research Institute of Marine Fisheries and Oceanography; in Canada, the Biological Board; in North America, the North American Fisheries Council and the International Passamaquoddy Fisheries Commission; these are only a few of the research agencies that carry on this tremendous research task: the study and possible control of oceanic life.

IMPLICATIONS FOR SCHOOLS

Land-dwelling animals that we are, the sea has been a barrier to us, something to pass over in boats or fly over in airplanes, an unchastened element, mystic, unconquerable. Now we are in a position to study it, utilize its life and power, learn how to increase its life and in a puny fashion begin to experiment with the control of its biological resources. This seems to be a threshold to something profoundly fascinating, enormously exciting. Perhaps this feeling is one of the things the school can communicate to its pupils.

The study itself is much involved, but its major findings and its significance are for general education. As citizens we shall approve or disapprove more assistance for oceanic investigations, and possibly as citizens we may look to the seas in some not so distant generation for a major source of food supply. Beyond the practical use to which the oceans may be put, and the geopolitical considerations involving the oceans which figure more and more largely upon the international scene, there is still the basic curiosity of man to understand his environment and in understanding it to feel more secure with it.

SOME GENERALIZATIONS FOR SCHOOLS

A list of basic generalizations has

four purposes: 1) to help the teacher generalize her own knowledge and experience with the problem; 2) to furnish teachers with a convenient tool for looking over the broad implications of the resource pattern for schools; 3) to act as a guide for the selection of experiences for the student; and 4) to use in setting up the evaluation program of the school. Generalizations are not taught directly, of course, but are goals of understanding toward which the school moves pupils through many different kinds of experiences.

The list is partial:

1. The sea was probably the original environment of all life, plant and animal, and we find in its supporting and sustaining medium, life, both plant and animal, far more primitive and simple than that we find on land.
2. Most of the life in the oceans, the bulk of the species and the bulk of the weight of living material, is microscopic and near-microscopic drifting life, unobserved and unknown even to those who live by the sea.
3. The pyramid of life in the ocean is based upon the utilization of inorganic compounds by microscopic one-celled plants drifting in the sunlight zone; the large animals of the sea are not herbivores, as they are on land, but carnivores, because the plant life is almost entirely microscopic and cannot be caught directly by large animals.
4. There is no uniformity in distribution of marine organisms throughout the oceans either horizontally or bathymetrically; there is no depth of water without life.
5. The fixed algae along the shore contribute to the food of the sea only in a very minor way, the principal food production being carried on by microscopic one-celled algae drifting in the water.
6. The production of lush plant and fish life in the oceans is dependent on the restoration to the photic areas of fertilizers which have sunk either into lower strata or to the sea bottoms.
7. Life in the oceans is delicately adjusted to conditions of temperature movement of the waters, availability of certain kinds of food supply, sunlight and the presence of dissolved gases.
8. The area available for food production in the oceans is some three hundred times as large as the area available on land.
9. The oceans are constantly in motion, the direction and speed depending on winds, the earth's rotation, changes in density, changes in composition and changes in temperature.
10. The oceans form a single dynamic mechanism, world-wide in operation and in influence.
11. The oceans distribute heat by means of the major oceanic currents from tropics to the temperate zones.

EXPERIMENTS TO TRY

1. To discover the percentage of dissolved solids in ocean water by evaporating and weighing.

2. To test for the presence of chlorides by means of precipitation of silver chloride from silver nitrate solution.

3. To test for presence of carbonates by barium solutions.

4. To investigate thermal stratification of sea water by applying heat to the top layer only and measuring temperature at various depths; a heat lamp will do for this.

5. To measure the density of sea water in various degrees of dilution by careful weighing.

6. To demonstrate the presence and function of dissolved gases in sea water by boiling it, covering the surface with an oil film, and measuring the survival of active marine animals in this compared to normal sea water.

FIELD TRIPS AND COLLECTIONS

1. Field trips to the seashore are especially productive when the habitats are thoroughly investigated, as when dead heads of coral are broken up, or permanently submerged sand and mud flats are sieved, or algae are washed in bottles of water and the residue exam-

ined. Ecological studies along the sea shores may be made to determine how the environmental factors influence the life in the sea; for example, how wave action along a coral reef limits the growth of certain corals; how mud deposited from stream mouths excludes many forms of life, or how, on wave swept beaches, the animals are adapted to stand the surge of the waves.

2. To demonstrte the existence of planktonic life: plankton nets may be constructed from a metal or even a stiff rattan hoop and some finely meshed cloth like fine bobbinet, fine-meshed muslin (50–60 meshes per inch), or some curtain material sewn into a cone. Planckton nets may be bought from the larger biological supply houses. When these are towed from a boat, a bridge or a dock in estuarine or open water, they will capture much microscopic life that can be preserved in formaldehyde or studied alive.

3. To collect animal forms of marine life. A flashlight sealed in a glass jar or an electric light on a waterproof cable and taped thoroughly with rubber tape suspended in the water on a dark night will attract myriad forms of life, most of which are newer encountered during the day.

4. Small balanced marine aquaria can be made if there is ample surface exposed to the air and the tank is not overcrowded with animal life.

5. To observe the spawning and development of the eggs of larger sea urchins or estuarine tube worms which may be collected for the laboratory.

6. To observe the development of some of the smaller shrimp, especially snapping shrimps, which are often found with eggs. If the females are kept in the laboratory in a small flat dish of water with some sea weed, the eggs will hatch and the larvae, which are a part of the plankton at this stage, may be studied.

7. To measure tidal fluctuations readings can be taken on scales attached to piling in quiet water or automatic devices can be constructed to record tidal movements on rotating scroll.

BOOKS FOR TEACHERS AND HIGH SCHOOL STUDENTS TO READ

Carson, Rachel, *The Sea Around Us.* Harper Bros., 1951.

Coker, R. E., *This Great and Wide Sea.* Chapel Hill, University of Carolina, 1947.

Colman, J. S., *The Sea and Its Mysteries.* London: Bell & Sons, 1950.

Fowler, G. Herbert, and Allen, E. J., *Science of the Sea: An Elementary Handbook of Practical Oceanography.* Oxford University Press, 1928.

Ommaney, F. D., *The Ocean.* London: Oxford University Press, 1949.

Sverdrup, H. U., Johnson, Martin, and Fleming, Richard, *The Oceans.* New York: Prentice–Hall, 1942.

BOOKS FOR ELEMENTARY PUPILS OR PUPILS WITH READING PROBLEMS

Baer, Marian, *The Wonders of Water.* New York: Farrar and Rinehart, 1938. (Grades 5–6)

Bronson, Wilfred, *Fingerfins: The Tale of a Sargasso Fish.* New York: Macmillan, 1931. (Grades 6–8)

Johnson, Eleanor, *Life In the Sea.* (Unit Study Book No. 253) Columbus, Ohio: American Education Press, 1935. (Grade 4)

McClintock, Theodore, *The Underwater Zoo.* New York: Vanguard, 1939. (Grades 6–9)

Patch, Edith, and Fenton, Carroll, *Holiday Shore.* New York: Macmillan, 1935.

Wells, Harrington, *Seashore Life.* San Francisco: Harr Wagner, 1937. (Grades 4–6)

Parker, Bertha, *Animals We Know.* Evanston: Row–Peterson, 1941. (Grades 5–6)

Edmondson, Charles, *Seashore Treasures.* Palo Alto: Pacific Books, 1949. (Grades 4–9)

Burgess, Thornton, *Seashore Books for Children.* Boston: Little Brown, 1931. (Grades 4–6)

Huntington, Harriet, *Let's Go to the Seashore.* New York: Doubleday, 1941. (Primary Grade)

Miller, Margaret, *Along Our Coast . . . Pacific Ocean.* New York: Dodd, Mead, 1942. (Grades 5–8)

Hylander, Clarence, *Sea and Shore.* New York: Macmillan, 1950. (Grades 5–9)

Incidental Teaching is Out

By GRANT W. JENSEN

THE American people have developed a mania for the high-powered sensationalism of our time. Unless products are highly advertised by singing commercials and raucous advertisements, striking fear into the hearts of potential customers or wooing them with many new devices, they have little chance of survival in our highly competitive market.

Perhaps this emphasis on the sensational, accounts for a portion of the indifferent attitude people show toward conservation. Yet the cost to the American people and future generations has been enormous. More important to educators is the sad fact that these costs continue to mount. The ravages of the floods in the midwest last spring were graphically reported in print, on the air, and on the screen. The water shortage in New York received similar publicity. At this writing the waters of the Sacramento are reaching the flood stage. To most people these are tragic events that pass in the day's news. But to thinking people they should be challenges calling for immediate action.

The past five years have seen the frequent sweep of dust storms, increasing in intensity, across the Southern part of the San Joaquin Valley. Many complaints were filed and conservation teams surveyed the area. Finally, the California State Legislature appointed an interim committee in 1948 to examine the dust control problem. In subsequent hearings excellent testimony was given by impartial soil scientists on steps to be taken to control this type of erosion. But the majority of farmers were waiting—waiting for action by someone beyond them. One large landholder, typifying the thinking of many, stated during one of the hearings that dust storms were due to the will of God. His solution was to wait and do nothing, except to continue to open new land and to farm the tilled land more intensively!

Along with the increase in population, the growth of our armed forces has called for an increase in our supplies of food and fibres. Farmers have gladly responded and cotton acreages particularly have increased immensely. But cotton requires much water , the supply of which is limited. During the summer of 1951, many of the farmers in the southern San Joaquin Valley were skeptical as to whether the water supply would

● The interest and leadership of the California Association of Secondary School Administrators in the vital problem of conservation is the subject of Grant W. Jensen's article. He especially emphasizes the importance of water in California, and indicates that careful direct planning and teaching are necessary for reaching the goals we wish to achieve.

Dr. Jensen, Principal, Shafter High School, Kern County Union High School, Shafter, California, has been chairman of the Conservation of Natural Resources Committee of the state secondary administrators association since 1948. He states, "I have outlined some of the issues involved and suggested the approach that the CASSA committee has been taking. The committee will welcome reaction to the article and particularly detailed teaching units that may be in use in some of the public high schools . . . " Dr. Jensen received his doctorate in education from Stanford University in 1951.

last long enough to mature their cotton. Even with the initial operation of the Central Valley Water Project, there was an overdraught of 1,500,000 acre feet of irrigation water. This water came from underground reservoirs, tapped by deep well pumps. In the Valley, water removed by underground pumping increased 46 per cent in the past summer!

All of this is quiet, grave news, not as sensational as the dust storms and floods that claim the headlines of the day, but in the facts and figures can be seen the necessity of pressing for a solution. It is to be remembered that the plan of transporting water from the Sacramento Basin to the San Joaquin Basin was proposed in 1921[1] It has taken thirty years for the first phase to become an operational unit! Obviously, the people of California cannot wait another thirty years for a solution to their present water problems.

Our problems do not center on the lack of scientific knowledge nor on engineering skills with which to translate the knowledge into practicable use. They rest rather on the attitudes of people and the useable information they possess. The application of this scientific information must be hastened by the understanding of our social processes and institutions whereby we may speed action in relation to the issues involved. Attitudes of people must be molded and thinking mobilized. This is essentially the responsibility of education.

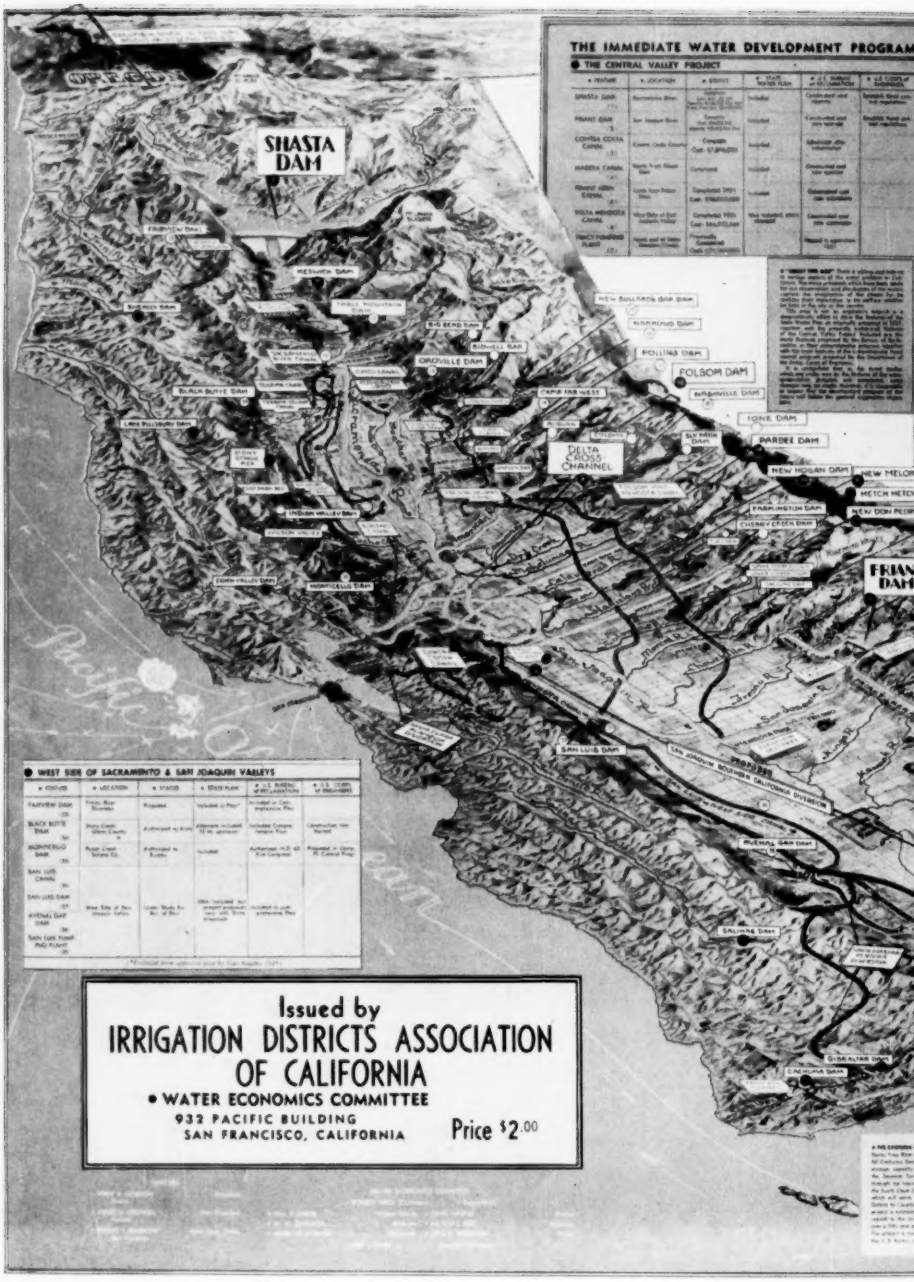
The committee on conservation of the California Association of Secondary School Administrators has considered many approaches to the problems of the place of conservation in the school program. During the past two years this committee of educators has sampled the opinions of secondary school administrators, contacted schools which had been reported as offering good programs in conservation, participated in a regional conservation program planned by the State Department of Education and the Department of Natural Resources, and assisted with a program on conservation in one county institute. The report prepared by the subcommittee on conservation education laid the basis for further expansion and guidance of the program.[2] The real work has been conducted through a continuing series of committee meetings designed to develop sound teaching guides for several courses in the curriculum.

The committee has found that some conservation education has been taught in most schools, while a few offer intensive work in this field. The majority have treated the subject in an incidental fashion with casual references to conservation when the time seemed appropriate in the classroom, when an Audubon Society film and lecture could be obtained, or a tree planted on the school ground. Nor have school administrators generally been impressed recently with the need for developing good conservation programs. Some reasons advanced for this lethargy include: the pressure of other issues; the emphasis placed on production rather than conservation; a decade of war production; the complacent feeling that existing school programs are good; teachers inadequately prepared to teach conservation.

The question of having teachers who can properly teach the subject is one that assumes critical importance. Not only are teachers loath to teach a subject with which they are unfamiliar but in most cases a poor job is the result. Realizing the importance of the great issues involved in conservation, the teachers' colleges of New York State took the

[1] Senator Herbert C. Jones, "Water for All," *Western Water News*, Nov.-Dec., 1951, p. 7.

[2] Subcommittee on Conservation Education, California Committee for the Study of Education. *Proposals for a Program of Conservation Education for the Schools of California.* California State Department of Education, Division of Instruction, June, 1949.


THE IMMEDIATE WATER DEVELOPMENT PROGRAM
THE CENTRAL VALLEY PROJECT
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KESWICK DAM
BIG BEND DAM
OROVILLE DAM
BLACK BUTTE DAM
FOLSOM DAM
NEW BULLARDS BAR DAM
NARROWS DAM
FOLLINS DAM
AUBURN DAM
TONE DAM
DARBEE DAM
DELTA CROSS CHANNEL
NEW MELON
HETCH HETCH
NEW DON PEDR
FARMINGTON DAM
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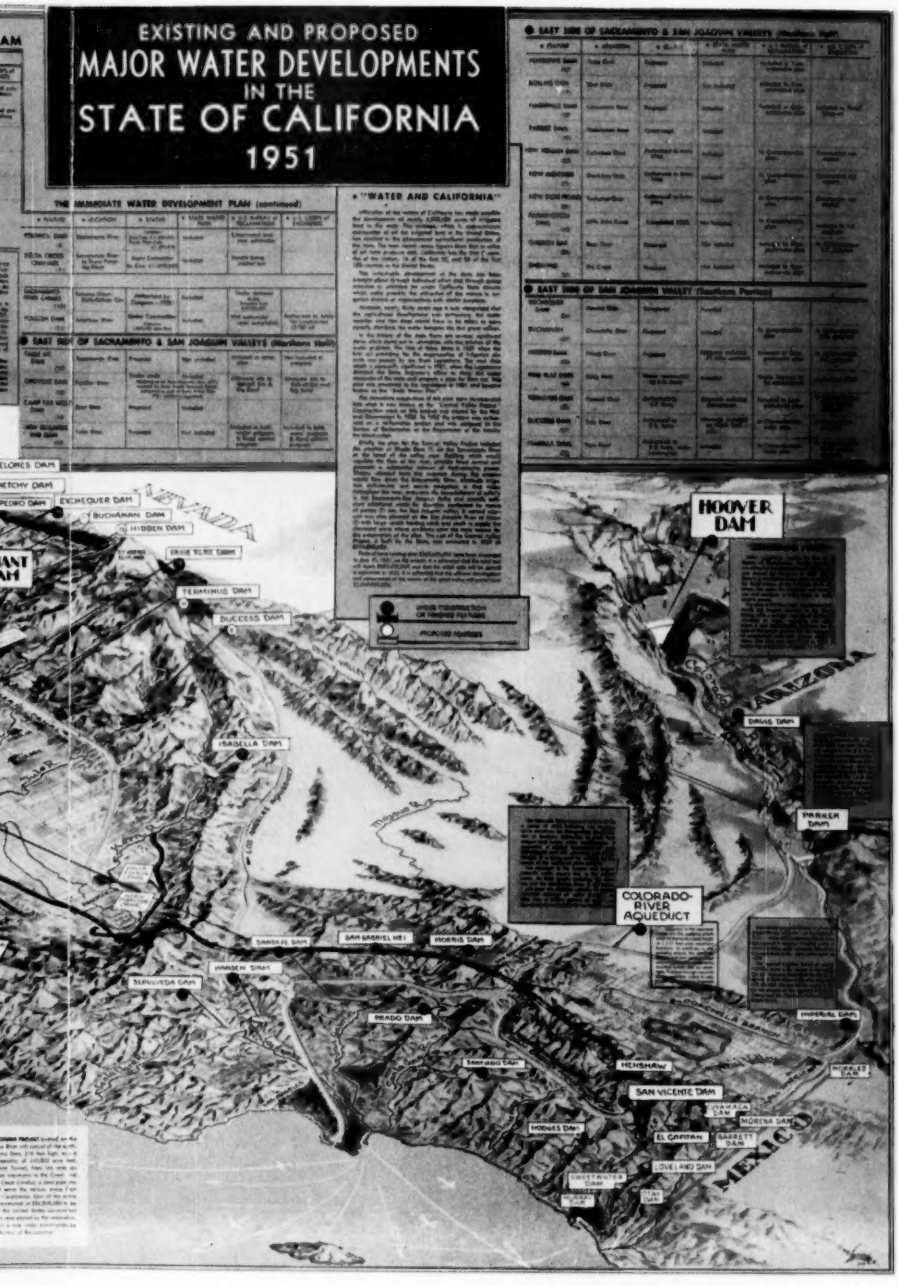
EXISTING AND PROPOSED
MAJOR WATER DEVELOPMENTS
IN THE
STATE OF CALIFORNIA
1951
"WATER AND CALIFORNIA"
EAST SIDE OF SACRAMENTO & SAN JOAQUIN VALLEYS (Northern Half)
EAST SIDE OF SACRAMENTO & SAN JOAQUIN VALLEYS (Southern Portion)
HOOVER DAM
ARIZONA
DAVIS DAM
PARKER DAM
COLORADO RIVER AQUEDUCT
IMPERIAL DAM
MEXICO
ENCHEQUER DAM
BUCHANAN DAM
HIDDEN DAM
TERMINUS DAM
SUCCESS DAM
ISABELLA DAM
SANTA ANA DAM
SAN GABRIEL NO. 1
MORRIS DAM
WARREN DAM
PERRIS DAM
MADO DAM
HENSHAW
SAN VICENTE DAM
MORENA DAM
EL CAPITAN
BARRETT DAM
LOVELAND DAM
HODGES DAM

lead last spring. After a series of meetings the college presidents decided that every future graduate of their institutions must take general work in the field of conservation education as part of the general education requirement.

M. Saber Selim, in his comprehensive study of conservation education in California High Schools, found that the present programs fell short of realizing the problem.[3] Not only were the teachings of facts, principles, and concepts limited but the creation of desirable attitudes for tomorrow's citizens was not realized particularly on the secondary school level. This study also points out the need for sequential organization of curricular materials, to assure the adequate introduction of conservation material in all grades of high school, along with the appropriately planned experiences that emphasize attitude formation.

Obviously the challenge is presented to educators in clear-cut terms. It is time that the leaders in our schools begin to plan *deliberately* an integrated program of conservation education that encompasses knowledge, attitudes, and a plan of action.

Principals charged with the development of the school program are working hard to find places in the curriculum for instruction in first aid, moral and spiritual values, narcotics and alcohol, and other required materials. Here lies another challenge to them to include in the directed school life of the students real issues in the conservation of natural resources that are significant for the present and future generations.[4]

The administrators' committee recognizes that the process of adding another course to the curriculum is certainly not the answer to our problem of providing information on conservation. Greater emphasis must be placed on the recognition of the importance of conservation education in the secondary school. This important field must be considered in many areas of our school program. It cannot be handled as a small appendage in the science program or limited to a casual reference in a history course.

The schools are finding themselves in the undesirable position of lagging behind public movements. Interest in the program of the school in conservation was reflected in the activities of the California State legislature in 1948, and proposals to legislate mandatory instruction in conservation. Other groups, such as the League of Women Voters and the Daughters of the American Revolution, have pursued the theme of conservation as the major topic for investigation during the past year. Editorials have appeared in many newspapers, and some adult evening schools have sponsored forum series on conservation. This general reawakening of public thinking strengthens the need for the consideration of strong programs in our schools. Unless the schools voluntarily investigate thoroughly planned instruction in this area, the idea of compulsion through legislation will become a reality.

Recognizing many of these problems, the administators' committee has been preparing a series of model units in the subject fields of English, Chemistry, Biology, General Science, Agriculture, Social Studies, U. S. History, Homemaking, and Physics. The intent is to supply the teacher with ideas that can be followed or will open other channels for work. The committee assumed that if the teacher is given aid in the concepts to be covered, types of materials available, and experiences to be utilized,

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[3] Mohamed Saber A. Selim, *Conservation Education in California High Schools*. Unpublished Doctoral dissertation. Stanford University, 1950.

[4] Literature on Conservation is plentiful. Two applicable articles are: H. D. Gwinn, "Let's Get Serious About Conservation," *California Journal of Secondary Education*, Oct. 1949, pp. 360-364. Rodney Ellsworth, "Conservation—The People's Business," *California Journal of Secondary Education*, May 1950, pp. 285-290. Excellent guide lines have been drawn in th following book: *Conservation in American Schools*, A.A.S.A., 29th Yearbook, N.E.A., 1951.

even the most poorly prepared teacher in this subject field, may do a creditable teaching job.

For example the unit of work prepared in relation to Biology includes material under five column headings. (A sample is given here of headings and material in Biology.) 1. Pupil Objectives (To comprehend the fact that all life depends upon natural resources.) 2. Pupil Experiences (A study of the chemistry of the animal and human body by demonstration, experimentation, and observation of compounds and some 16 of 18 elements and their interrelationship between life and natural resources. 3. Evaluation (Teacher observation related to the attention of the pupil, and subsequent relevant questions in addition to teacher-pupil correction of laboratory and home work.) 4. Audio-visual Aids (Films listed are: "Food and Soil", "Heritage We Guard", "Wearing Away of Land", and the filmstrip, "Water Resources".) 5. Source Material (This list includes books and pamphlets that can be consulted by teacher and students.)

This type of resource unit gives the basic ideas and aids to be developed by the teachers. It is incumbent upon school principals to direct investigations of conservation problems in their local areas. The staff must be stimulated to place in effect carefully planned sequential experiences covering local, national, and international aspects of conservation. Valuable allies can be found in such agencies as the U. S. Forest Service, Soil Conservation Service, and California Department of National Resources. Many of these agencies have been conducting limited educational programs, preparing bibliographies and study guides for teachers. The work of the schools can be greatly enhanced through closely coordinated activities with the public agencies.

The exploitation of our natural resources raises problems of concern to every American. Knowledge alone is not sufficient, but must be accompanied by applied information and wholesome attitudes. Instruction in local problems must be expanded to encompass national and world affairs for our nation continues to reach into other lands for basic materials.

The very importance of the problems of conservation in our lives should be sufficient cause to include instruction in this field in the curriculum. Recognition by public-spirited groups that action must be taken should speed the analysis of each local school program.

To assist teachers plan their work and use good teaching materials the C.A.S.S.A. committee on conservation plans to issue its report this spring showing how units of work can be incorporated effectively in present courses of study. It is past the time for incidental teaching—the challenge is to establish deliberately a sound framework of conservation education in our secondary schools.

SPECIAL MAP AVAILABLE

A special map of Existing and Proposed Water Developments in California is included in this issue of the *Journal* through the courtesy of the Irrigation Districts Association of California, 932 Pacific Building, San Francisco.

This map is available in large wall chart form, size 27 x 38, for classroom use. The regular price for the map is $2.00, but it will be available to readers of the *Journal* for $1.00 through special courtesy of the Irrigation Districts Association at the above address.

The Junior High School as an Educational Problem

By GEORGE WILLARD FRASIER

● What will be the reaction of junior high school educators to George Frasier's reference to their institution as an "Educational Problem"? The historical roots and development of junior high schools and the present complex issues facing them are provocatively sketched in bold relief in this article as a prelude to the March 1952 issue of the Journal which will feature a symposium on the Junior High School.

Dr. Frasier achieved eminence in American education as President for twenty-five years of Colorado State College of Education, Greeley, Colorado. Now emeritus, he gives his address as Palo Alto, California, from which point he continues his leadership principally through writing. He is lecturer in education at Stanford University. He is author of some twenty-six volumes, the most recent being "An Introduction To Education." He received his Ph.D. from Teachers College, Columbia University in 1922.

THE junior high school is the most American part of our public school system. It has no counterpart in other countries. This cannot be said of any other part of our school system.

Where did the junior high school come from? How did it happen to spread so widely over America? How well is it working? What of its future?

The junior high school did not grow out of the needs of public education as visioned by superintendents or principals. Neither was it dreamed up by school board members nor demanded by the patrons of the school. No, the new organization of the school system was planned by national committees chairmaned by university presidents. The presidents most important in this movement were Eliot of Harvard; Harper of Chicago; Butler of Columbia; Suzzallo of Washington and Baker of Colorado. Each of these men headed an important committee that dealt with some phase of the reorganization of the public school system.

During the last part of the nineteenth century higher education in America was largely influenced by German education. In fact, this influence extended through to the end of the first world war. When the author was a student in a teacher's college in the second decade of this century, a great many of his teachers were graduates of German Universities. This was true in most of our colleges and universities. A young man, who aspired to become a college professor, took his family with him to Germany where he spent sufficient time to get a Ph.D. from one of the great German universities. American higher education was measured by the German standard. A great many university presidents aware that in America, boys and girls entered college about two years older than was customary in Germany sought to remedy the situation. It is interesting to note that in all of the material written at that time no one pointed out that the whole German education system was different from ours. Germany provided one school system that did not lead to college and another one, for a selected few that did. Whereas in Germany only a few young men were allowed the privilege of a university education, in America a single system of education permitted any boy with ability to go to college. Thus the American secondary schools served two purposes. Nevertheless, college administrators set about to make the American secondary school better fit the German pattern of higher education.

Dr. Charles W. Eliot, President of Harvard University, was one of the first to become vocal concerning the length

of time it took to prepare an American boy to enter college. He made two addresses before the Department of Superintendence of the National Education Association. The first address, made in 1888, was entitled "Can School Programs be Shortened and Enriched?" The second address, in 1892, was entitled "Shortening and Enriching the Grammar School Course". It was Eliot's opinion that there was much waste of time in the elementary school, particularly in the last two grades (the seventh and eighth) and for this reason students entered high school and college two years later than was necessary.

Two notable committees studied the questions raised by President Eliot. The Committee of Ten, under the chairmanship of Dr. Eliot was appointed by the National Council on Education in 1892. The purpose of the committee was to study the reorganization of secondary education to facilitate the economy of time. It made its report in 1893. Several groups of experts, in various academic fields, assisted this committee. Each group advised that the subject matter in the field it represented should begin at an earlier point in the course of study. The Committee of Fifteen, appointed by the Department of Superintendence submitted its report in 1895. This committee also decided that some of the secondary school work might well begin at an earlier grade, for example, algebra and Latin in the seventh or eighth grade.

Another National Education Association committee reported in 1899. This Committee on College Entrance Requirements expressed itself in favor of "a unified six-year high school course of study beginning with the seventh grade." It further said:

> "The most necessary and far-reaching reforms in secondary education must be begun in the seventh and eighth grades of our schools. Educators agree that these grades must be enriched by eliminating non-essentials and adding new subjects formerly taught only in the high school.
>
> "In our opinion these problems can be solved most quickly and surely by making the seventh and eighth grades part of the high school, and under the immediate direction of the high-school principal."[1]

Thus the junior high school was proposed as a time saver. The senior high school by moving some of its subjects down into the seventh and eigth grades could prepare students to enter college at an earlier age.

It is not possible in limited space to tell the stories of the many committees that studied this problem. However, mention should be made of a report of a committee on the Cultural Element and Economy of Time in Education that was made by the chairman, President J. H. Baker of the University of Colorado. This report, presented to the annual meeting of the N.E.A. in Cleveland in 1908, recommended a six-year elementary school and a six-year secondary school.

Economy of time was the watchword of all committees reporting on the problem of reorganization of our schools from 1890 to 1910 and even later. It was this demand for economy that lead to the establishment of a six-year elementary school, and eventually to the junior high school. I hasten to add that so far as I can find, there is no instance where the establishment of the 6-3-3 plan of organization shortened the school period or enabled students to enter college at an earlier age.

The junior high school came into being about 1909. There were several examples of schools being reorganized on the 6-3-3 basis by 1911. These schools were as widely scattered as Columbus, Ohio; Berkeley, California; Concord, New Hampshire and Grand Rapids, Michigan.

During the twenties the reorganization of the public school system into a

[1] N.E.A. Annual Report, 1899, p. 659.

six year elementary school, followed by a three year junior high school, and a three year senior high school swept the country. No new movement in education ever made such rapid progress.

At the end of the First World War the schoolhousing shortage contributed to the rapid spread of the junior high school idea. In 1918 there was a great need for more housing at all levels of education. No schoolhouses had been built during the war. In many cities such as Denver, Colorado there was an accumulation of several years of building needs. I use the Denver schools as an example because I had something to do with the building program in that city in the early twenties. In 1920, Denver was in desparate need of school buildings. Both the elementary and the high school plants were inadequate. The junior high school helped in the solution of the problem. The first junior high school that was built relieved the crowded condition in one senior high school and in a half-dozen elementary schools. Denver at this time adopted the 6-3-3-plan of organization. Additional elementary and senior high schools were also built. The same thing happened in a great many cities. The new type of school helped school districts solve their housing problems. In many small communities the erection of a junior high school building relieved the congestion in the senior high school and in all elementary buildings. In this way the addition of a single building solved the school building problem in a community for several years.

This junior high school that was born out of a need to shorten the college entrance course by two years, and then spread over the country as an answer to the housing shortage was not always an educational success. Too often the new junior high school with its new building and equipment lacked teachers, curriculum and a working philosophy.

Most of the teachers for this new school came from the seventh and eighth grades and from the first year of the four year high school. These were combined under a principal who was usually prepared in the secondary field. They often failed to make an educational unit of the new school.

The course of study was at first made up of the courses in the seventh and eighth grades combined with the ninth grade of the traditional high school. In some schools an honest attempt was made to understand the philosophy of the new school and the psychology of the adolescent child and to construct a curriculum to fit the needs of the children. But many schools made no attempt to make this a new type school.

Perhaps the picture I have painted of the junior high school is unfair. It should be noted that during the twenties and thirties a great deal of time and energy went into studies of the problems of junior high schools. The literature of this period deals with all phases of education on the junior high school level. In fact, a philosophy of junior high school education emerged from these studies. In other words, the schools were set up for one purpose. They spread because of another, and finally some years later developed a philosophy which was unrelated to either.

The junior high school is properly a school planned for young adolescents. It brings together boys and girls roughly from twelve through fourteen years of age. This group does not belong in the elementary school with its maternalistic approach to education, nor does it belong in the senior high school with its more adult and individualistic approach to education.

The junior high school curriculum provides a much better educational program for adolescents than is found in the elementary school. It offers a program that is more general in character

than that found in the senior high school. The junior high school is more concerned with the problems of general education, that is, with the education necessary for all individuals regardless of sex, nationality, or mental endowment. There are many broad and comprehensive courses in the junior high school. Usually the class periods are longer than in either the elementary or secondary school. The subject matter is more closely connected with the needs of the children. All children are usually required to take certain large, general core courses. These are usually in such fields as social living, health, general science, practical arts, fine arts, general language, music and mathematics. The junior high school has a much more functional program than the senior high school. This is largely due to the fact that it is not dominated by the pattern of college entrance set by higher education for the senior high school.

Are the junior high schools in California planned and conducted as the one described above? Do we still have some junior high schools that are made up of three grades housed in the same building? Do we have junior high schools conducted as little high schools? Are these schools an educational success?

The junior high school was the most popular part of the public school system when it was first established. It was the show place. It was a bright spot. During the last ten years the junior high school seems to have lost ground. Have these schools lost their popularity in California? Are they fulfilling their educational functions?

The answer to these questions concerning the junior high school may be "yes" in some schools and "no" in others. The difference lies in the type of leadership exerted by the superintendent and principal and the kind of teachers with which the school is staffed.

The teachers for our public schools come from our colleges and university schools of education. How good a job are these institutions doing in preparing teachers for the junior high school? Someone should study this question. My observation is that the preparation is very poor. Our professional schools prepare teachers of art, music and physical education. They prepare teachers for kindergartens, elementary and secondary schools. But they largely fail to prepare teachers and principals for the junior high school. Perhaps this is the reason why many junior high schools have gone into a tailspin. A careful perusal of the catalogs of over thirty schools of education and teachers colleges, last summer, failed to discover a single school where a teacher might make special preparation as a junior high school teacher. The junior high school is largely an orphan in education. It is a school without specially prepared teachers.

In California, teachers with either elementary or secondary credentials are permitted to teach in the junior high school. I doubt the value of this plan. The best possible elementary school teacher is not adequately prepared to teach in a junior high school. The philosophy, the psychology and the teaching methods are different. A well prepared secondary school teacher, trained to teach in a subject matter field, is not equipped for junior high school teaching.

The same is true of the principalship. Very often a secondary school assistant principal is made principal of the junior high school. Nothing could be worse! Many junior high schools have been destroyed because the principal has attempted to run them as "little senior high schools".

Industrial Arts Programs in Small California High Schools

By E. MILTON GRASSELL

● **Industrial Arts is one of the subjects of growing importance in the high schools of today. This is a reflection of the widespread mechanization of production in the United States. The report by E. Milton Grassell, former Industrial Arts teacher at Linden, California, Union High School, of the survey which he made for his Master of Arts thesis is, therefore, of timely interest. Mr. Grassell received his M.A. degree from the College of the Pacific in June, 1951.**

IN GENERAL, the purpose of industrial arts education is to give the student ample means of exploration, provide a wide variety of manipulative experiences, and offer numerous contacts with industrial products. According to a recent survey,[1] many industrial arts programs in california high schools are not sufficiently broad in content to meet the objectives of industrial arts education or to meet the needs of youth in our present highly complex industrial world. This study is based upon a 75 per cent return of questionnaires sent to all administrators of California high schools with grades nine through twelve and an attendance of three hundred or less.

Schools with no industrial arts programs. Approximately 14 per cent of the schools that were included in this survey offered no industrial arts instruction. In general, the smaller schools tended to be the ones without industrial arts programs.

Although agricultural education and farm mechanics were delimited, 7 per cent of the administrators of schools that provided no industrial arts education stated that some phases of industrial arts work were included in their agriculture programs.

Frequency of specific areas of instruction. The various areas of instruction shown in Table I refer to experience areas of instruction rather than to specific courses. No differentiation was made on the questionnaires to segregate the various experience areas of instruction included in general shops from specific unit shop courses.

TABLE I

FREQUENCY OF EXPERIENCE AREAS OF INSTRUCTION IN INDUSTRIAL ARTS IN CALIFORNIA HIGH SCHOOLS, GRADES 9-12, WITH AN AVERAGE DAILY ATTENDANCE OF 300 OR LESS

Experience Areas of Instruction	Per Cent
Mechanical drawing	86
Woodwork	86
Welding	63
Carpentry	58
Auto mechanics	47
General metal work	46
Cement work	42
Sheetmetal	42
Architectural drawing	40
Electrical work	36
Machine shop	33
Forging	32
Patternmaking	8
Foundry	7
Printing	7
Radio	4

Table I indicates that the more traditional industrial arts subjects such as woodwork and mechanical drawing still maintained precedence over other industrial arts experience areas of instruc-

[1] E. Milton Grassell, *Industrial Arts Programs in California High Schools*, Unpublished Master's Degree Thesis, Stockton, California: College of the Pacific, June, 1951.

tion. In general, woodwork and mechanical drawing were offered at a frequency that was approximately twice that of general metalwork, sheetmetal, and architectural drawing. Experience in electrical work was given in slightly more than one-third of the schools, and approximately one-third of the schools provided instruction in machine shop and forging. Patternmaking, foundry, printing, and radio were at the bottom of the frequency list; less than 10 per cent of the high schools provided instruction in these particular areas.

Physical facilities. The survey indicated that about half of the high schools have satisfactory industrial arts laboratories. Among the facilities mentioned most frequently as being inadequate were planning rooms and finishing rooms. Inadequate storage space and floor plans that do not permit efficient conduct of activities caused other current problems in many schools. Most of the schools had adequate hand tools for their respective courses, but additional power tools were needed by many.

Industrial arts instruction. It was indicated that the majority of the schools have class periods of sufficient length for adequate instruction, and the courses that were offered were adaptable to new and changing needs and interests of the students. In addition to ample textbooks and reference materials, adequate use of audio-visual aids was apparent in nearly all schools.

One of the most noticeable instructional problems was the correlation of industrial arts with other school subjects.

About 35 per cent of the schools offered no industrial arts education for girls. Unfortunately, comments on the questionnaires from many of the schools that provided no industrial arts instruction for girls showed that this need was not recognized.

Health and safety. Reports from nearly all of the schools indicated that adequate safety devices were provided on all equipment. Lighting, heating, and ventilation were not adequate in about 21 per cent of the schools.

Teacher qualifications. The high school administrators rated their respective industrial arts teachers very highly in regard to personality, interest in the students, membership in professional organizations, and work experience in the respective fields in which the instructors were engaged.

Eighteen per cent of the industrial arts teachers had completed minors in industrial arts; 71 per cent had completed majors in it; and 11 per cent had completed neither a major nor a minor in industrial arts while in college. Approximately 7 per cent of the above mentioned industrial arts teachers held California Emergency Teaching Credentials.[2]

Recommendations. The following list of recommendations is based upon conclusions made from returned questionnaires in the light of literature in the field of inquiry.

1. Each school, regardless of size, should provide adequate industrial arts facilities and instruction.

2. Schools that do not provide industrial arts education because of financial limitations should investigate the general shop method of instruction. The general shop affords ways for increasing teacher efficiency and lowering the cost of industrial arts programs.

3. The content of each industrial arts program should consist of broad, general training in the principal basic industries; thus, the program should not be limited to intense training in only a few specific unit shops.

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[2] Some of the teachers in the group that had neither a college major nor a minor in industrial arts possessed General Secondary Teaching Credentials which allow the holders to teach industrial arts; this accounts for the fact that only 7 per cent instead of 11 per cent held Emergency Teaching Credentials.

4. Schools that offer a limited number of unit shop courses should investigate the present trend of converting these shops into general shops. Usually, the general shop is not only the most economical way, but, also, it is often the best way to teach industrial arts to boys and girls.
5. Immediate improvement should be made in each school that reported improper lighting, inadequate heating, and insufficient ventilation.
6. Adequate industrial arts physical facilities should be provided by each school district.
7. Provisions should be made so that girls may elect industrial arts courses.
8. An attempt should be made to correlate industrial arts with other school subjects.

For high school principals . . .

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